THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. SEPTEMBER 2, 1897. CHICAGO, ILL. NUMBER 35.

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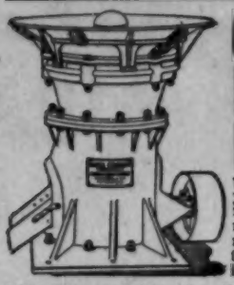

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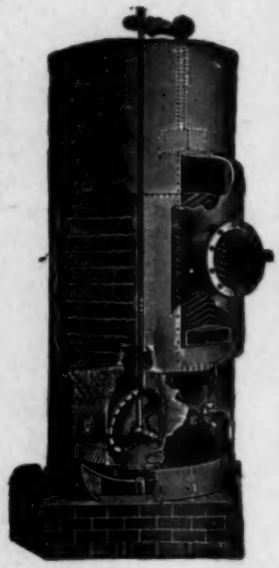

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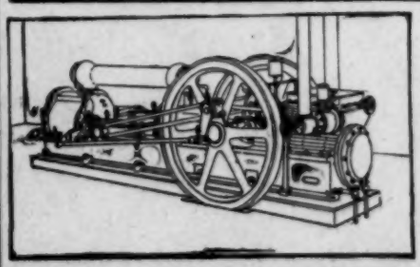

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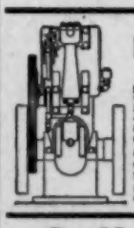

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THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. SEPTEMBER 2, 1897. CHICAGO, ILL. NUMBER 35

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Each week makes its own additions to the factors of strength in the iron market. Mills are gradually adding to the tonnage on their books; steel works have a large business ahead in material for wire, wire nail, sheet and tin plate producers; blast furnaces are increasing their sales and makers of foundry iron, who have been in general the weakest sellers in the whole line, are taking a position indicating that the turn is actually at hand. The pig iron situation is strengthened by the fact that since April there has been each month a moderate reduction in unsold stocks. Within the week the Eastern speculative interest that took 100,000 tons of Southern iron off the market three months ago, has been negotiating again, and several blocks of iron are reported taken. In the Chicago district a conference of Southern and Northern interests has led to a better understanding as to prices, and the very low figures on Chicago iron, both nearby and at Lake Erie points, are no longer quoted. Western New York iron that has been sold at low prices in the East, having the advantage of water freights, is now 25 to 50 cents higher. A significant fact is the increase in the size of purchases by foundries, which may be taken to indicate both that the melt of iron is greater and that buyers are providing against the advance now generally expected. Bessemer pig iron holds the ground gained and the attitude of sellers shows their confidence in a stronger market in the latter part of the year. Offers of $9.40 at valley furnace for the balance of the year have been declined, and while a limited amount of $9.50 business has been taken, deliveries in the first quarter of 1898, other furnaces decline this as committing them too far in the future on so moderate a basis. Billets hold to the advance of about $1 from the lowest point, and prompt sales at $14 75 and $15, Pittsburg, have been made, while 25 cents more is asked on later deliveries. A broadening business in nearly all forms of finished material, added to the large amounts booked on long contracts in the past two months, guarantees steady operation of many plants for several months. The unanimity of the reports of increased demand, made by wrought pipe manufacturers at their meeting in Pittsburg last week, is an index to existing conditions. There is stock replenishment in all directions. That the prosperity which is so abundant in the agricultural community has begun to extend in a natural way is seen in the demand upon wire and wire nail concerns, in the clearing up of accumulated stocks of agricultural implements, wagons, etc. Export inquiry keeps up. Pennsylvania steel makers have had opportunity to bid on many thousands tons of rails, billets and sheet bars for delivery in Great Britain, in the past few months, but made no effort for the business in view of the tonnage already in their mills and, as well, the advancing ocean freights. Just now 18,000 tons of rails and track material for the Imperial Railway of Japan is up for American bids.

THE CLEVELAND DISTRICT.

The ore trade has moved along in the past four weeks at a pace that furnishes a good index to the immediate future of the iron trade. Large buyers and small buyers saw the turn of events simultaneously, and to the 200,000 tons and upward bought by a Chicago interest and fully 300,000 taken for Pittsburg delivery must be added lots ranging from 10,000 to 25,000 tons, going to a diversity of furnace interests. Standard Bessemer ores remain the same, but on non-scheduled ores which went at surprisingly low prices in the early summer, sellers are now asking enough additional—say 15 to 25 cents a ton—to cover lake freight advances. There is little or no speculative buying; but here and there an effort to get more of old-range Bessemers than buyers can supply indicates that the low prices of this years are not expected to be duplicated in 1898. Lake freights are very firm at 60c, 55c and 50c, Duluth, Marquette and Escanaba respectively, and ore shippers are getting very little tonnage. The situation in freights is strengthening, and between coal and grain, if the coal strike should end speedily, ore would have to pay still higher rates. For the next two months the outlook is for only a moderate movement of wild ore, but whatever the quantity it will probably pay substantial advances.

Pig Iron Considerable activity in foundry iron for Cleveland delivery is reported, lots of 200 to 500 tons being closed, but thus far at unchanged prices. A 2,200-ton contract let at Akron included 1,200 tons of No. 1 Northern, which went to the Shenango Valley at a shade below $9.40 at furnace. The balance was Southern soft, divided between two sellers. Some Scotch irons are now held at $9.50 for No. 2 and $10 for No. 1, as minimum, at furnace. Forge iron has been in good demand, and while $7.65 at furnace was touched recently, valley mills have been unable, in the past week, to buy below $8.10 at mill, the freight being 10 cents from nearest furnaces. Sellers are now quoting $8.25 at furnace. Bessemer is firmly held at $9.25 for September delivery and $9.40 to $9.50 at furnace for the next three months. In the past week $9.40 for last quarter, 1897, and $9.50, first quarter of 1898 have been declined. We quote, f.o.b. Cleveland:

Bessemer	$9 90@10 15	Valley Scotch No. 1	$10 15@10 65
No. 1 Strong Foundry	10 25@10 65	Valley Scotch No. 2	9 75@10 15
No. 2 Strong Foundry	9 50@10 00	Gray Forge	8 65@ 8 75
No. 3 Foundry	9 25@ 9 40	Lake Superior Charcoal	12 25@12 75

Billets and Rods Purchases of 600 tons of basic billets are reported, and of 3,000 tons of Bessemer billets. On the latter $14.75 Cleveland is quoted, but has not been established in transactions as yet. A sale of 10,000 tons of tinplate bars is reported, divided between Western Pennsylvania and Central Ohio plants of the same company. The valley quotation on sheet and tinplate bars is $16 to $16.25. Inquiry for rods is less active; mills are now quite well sold ahead and quote $21.

Finished Material. A good run of business is reported in nearly all lines. Two down-town blocks calling for about 1,200 tons each are in the inquiry stage, though work will not begin until late in the spring. A Central Ohio contract has been closed for 500 tons of flange steel and recent architectural requirements for an Ohio concern amount to 900 tons. An agricultural works contract for 700 tons of plates and bars will be closed in the coming week. Plate business has been good and mills are gradually filling up, though prices are no higher as yet. Bars are maintained at 1c, Cleveland, for iron or steel, in carload lots. Sheets have advanced $1 to $2 a ton. No. 27 in ordinary lots are sold at 2c to 2.05c, Cleveland delivery. Old material is in better demand and higher. Old iron rails are held at $12.50, delivered Cleveland mill, and No. 1 wrought scrap at $11.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, Sept. 1.

In nearly every branch of the market large sales were made last week. The demand is very large, and orders have been more frequent and heavier than for a long time past. The market is firmer, and advances have been made in most products, and further advances are expected in the near future. Buyers and sellers alike seem to have become imbued with the idea that the future is very bright, and that fall business is more than likely to be heavy. As a consequence, buyers have come into the market for a heavy tonnage, and want to purchase as far ahead as possible, while sellers, on the other hand, are becoming more conservative and are not pushing for trade as much as formerly. It is fast becoming a sellers' market.

PIG IRON.—Pig iron circles were disturbed somewhat last week by the report that there had been a combination effected between the Southern and Northern furnaces, with a view to forcing prices considerably higher than the present range. While the report was exaggerated, there is some foundation for it. The Southern furnaces were represented here last week by the president of the largest Southern interest, who held a conference with the largest local furnace interest. It had been reported for some time past that the local irons were being sold at a very low figure, much under the published quotations, and this report was considered worthy of investigation by the Southern furnaces. At the conference it developed that Northern irons have been selling all along at not far from the basis for Southern irons, and that some of the reports of extremely low prices were incorrect. As a result of the conference the Southern furnaces have decided to advance their prices somewhat, and the advance undoubtedly will be effective before the end of the present week. In fact, quotations on No. 2 Southern soft have already been put up 25 cents. Quotations on local irons have been advanced 25 cents all around by one interest here, and it is likely that the Illinois Steel Co. will announce higher prices before the week is out. No combination has been effected between the furnaces, but in place of promiscuous cutting, the result of misunderstanding, confidence and better feeling have come to the selling interests. While the market will be left to advance naturally, as before, it is evident that there will be better opportunity for this now that the various interests are agreed in facilitating the better tendencies in the market and do not fear cutting of prices. Sales last week of both Northern and Southern irons showed an increase, and as the inquiry is keeping up further good business is expected. The bulk of the business closed was in comparatively small orders, none having been taken over 1,500 tons. Orders from concerns that were supposed to have been filled up for some time ahead are frequent, and constitute one of the most favorable indications. Buyers are purchasing much more heavily than had been expected, too, and several concerns that have not been in the market for a long time past have recently made their appearance as buyers. Altogether, the prospects for future business are quite as good as could be wished. The furnaces are very firm in their views, and as already intimated, advances are expected to be made in quotations within a short time. We revise our quotations as follows:

Lake Sup. Charcoal	$13 00@13 25	South'n Coke No. 3	9 60@ 9 85
Local Coke Fdy. No. 1	10 50@11 00	Southern No. 1 Soft	$10 60@10 85
Local Coke Fdy. No. 2	10 25@10 75	Southern No. 2 Soft	10 00@10 25
Local Coke Fdy. No. 3	10 00@10 50	South'n Silveries	10 60@10 75
Local Scotch Fdy. No. 1	10 50@11 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	10 25@10 75	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 00@10 50	Alabama Car Wheel	15 50@16 00
South'n Coke No. 1	10 75@11 00	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 00@10 25	Coke Bessemer	11 50@12 00

BARS.—Orders for bar iron from car builders have been quite large in the week, several good contracts of this class having been closed. Further early orders from car works are expected. General business has been excellent, also, and quite a number of good contracts have been closed in the week. Prices are much firmer, and are now made at 1.10c to 1.15c for common iron, 1.15c to 1.20c for soft steel bars from strictly billet stock, and 1.20c to 1.25c for guaranteed iron. Some of the mills are so well filled with orders that they are asking even higher prices than these, but a few will accept desirable business at prices slightly under those we give. The tendency is upward, and it is thought that all the low-priced iron will be out of the way within a very short time.

RAILS AND TRACK SUPPLIES.—The local mills are filled for the balance of the year on heavy sections, and are only taking some small business. Light sections are in good demand, but sales have not been large. The market is very firm. Quotations are made: Rails, $19 to $21, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

BILLETS AND RODS.—Large orders have been taken by the local mills lately, and they are now well filled for some time ahead. As a consequence they are not desirous of taking much further business, and are not pushing sales. Prices are higher, and are now made at $16.50 to $17 for billets, and $23.50 to $24.00 for rods.

STRUCTURAL MATERIAL.—The contract for the material for the track elevation of the Pennsylvania road, amounting to about 5,000 tons, was let last week, the material to be made in Pittsburg. Aside from this no large orders were entered, but the general run of small orders made a very large tonnage for the week. The demand is increasing all the time, and seems likely to keep up for some time. There are several good sized contracts now being figured, which will come up within a week or two. The C. B. & Q. Ry. is taking figures on a bridge at Quincy, Ill., which will require about 1,000 tons. This will be let soon. The market is very firm, and several of the agents here have advanced quotations, in response to the Eastern market, but the largest Pittsburg interest is holding to the old prices still. It is not thought, however, that the present low level will maintain long. We quote: Beams and channels, 1.15c to 1.20c; angles, 1.10c to 1.15c; plates, 1.10c to 1.15c; tees, 1.30c to 1.40c. Small lots from stock are quoted one-quarter to one-half cent higher.

PLATES.—Sales last week were excellent and included several large contracts. Others are in view and will be closed soon. Small orders are frequent and total a good tonnage for the week. Prices are very firm and have been advanced by several of the mills. We continue our quotations: Tank steel, 1.10c to 1.20c; flange steel, 1.20c to 1.25c; fire-box steel, 1.85c to 5c.

SHEETS.—Business has been quite good and several large orders were taken last week. General business in small lots is much better than it has been for several weeks. Quotations are unchanged at 1.90c to 2c for No. 27 black, and 80 and 10 per cent discount for galvanized.

MERCHANT STEEL.—Dealers here report a good week's business, with an increasing demand. Sales last week included several good contracts, but none of especially large size. The market continues very firm. Quotations are as follows: Open-hearth spring, tire and machinery steel, 1.60c to 1.70c; smooth finished machinery steel, 1.50c to 1.55c; smooth finished tire, 1.35c to 1.40c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—Some of the Western roads have disposed of large lots of scrap within the week, but aside from these sales, all to dealers, nothing large has been closed. The demand is not large and shows no signs of increasing at present. The quotations below are dealers' asking prices for old material:

Old iron rails, gross	$11 25@$11 50	Axles, net	$13 50@$14 00
Old steel rails, gross	7 00@ 7 50	Cast borings, net	3 75
Old wheels, gross	10 00@ 10 25	Wrought turnings, net	4 00@ 4 50
Railroad forge, net	10 50@ 11 00	Axle turnings, net	5 50@ 6 00
Dealer's forge, net	9 00@ 9 50	Mixed steel, gross	6 25
No. 1 mill, net	7 50@ 8 00	Stove plates, net	5 50@ 6 00
Heavy cast, net	7 00@ 7 75	Heavy melting steel gr.	7 00@ 7 50
Malleable cast, net	8 00@ 8 50	Old iron splice b., gr.	11 00@ 11 25

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, Sept. 1.

The strength in billets, rods, sheet and tin bars and consequently in Bessemer pig, is unabated, and gray forge is an addition to the rising market. Steel mills are now thoroughly independent, while furnacemen quote with more assurance. Sheets continue the conspicuous feature in finished material, with wrought pipe, skelp, plates and tin plate also active. The meeting of pipe manufacturers resulted in higher prices that so far have been firmly held. Pipe mills are heavily booked.

PIG IRON.—Closely following better prices for Bessemer iron, the turn in gray forge has come in the week. Valley furnaces, recently low sellers, have withdrawn all quotations below $8 and are asking $8 and higher, while in Pittsburg a lot of 1,000 tons netted $8.50 to the selling furnace. September delivery. Bessemer continues strong and for last quarter delivery is

quoted at $9.35 to $9.50 at valley furnaces and for September iron $9.25 is bottom. Pittsburg iron at $9.60 to $9.75 is likewise stronger. Having disposed of its piled stock, it is stated the Claire furnace at Sharpsville will blow in and the rebuilt Rosena furnace at New Castle will also be in blast in the next two weeks. Quotations are made as follows:

Bessemer at valley furnace	$9.25 to	$9.50
Bessemer delivered Pittsburg Dis rict	9.65 to	9 75
No. 1 Foundry	10.25 to	10.50
No. 2 Foundry	9.50 to	9.65
No. 3 Foundry	9.35 to	9.50
Gray Forge, Valley		8.00
" " Pittsburg		8 50

BILLETS, SHEET BARS AND RODS.—Not only for billets and rods but also for tin plate and sheet bars is there an unusually strong market. Prompt shipments of billets are especially in demand, while even for last quarter business buyers are readily paying the prices asked. The steel tonnage already booked is heavy, extending, in tin and sheet bars, far into next year. Billets for September delivery are held at $15 Pittsburg, $14.35 to $14.50 valley and $14 25 Wheeling. Later deliveries are 25c higher. Sellers of sheet and tin bars are holding for $16.50 at mill, although sales at $16.25 have been made. Rods, although little business is reported in the week, are still strong and are quoted at $20.50 to $21.

BARS.—The strike at the mills of Jones & Laughlins is causing inconvenience in making deliveries on steel bars, but no effect has been felt by other mills. Bars are in demand and none are available below 1c. Quotations are 1.05c to 1.10c. Orders for common iron are going largely to the valleys and 1c is the basis of recent sales. Muck bar is active at $17.50 to $17.75.

SHEETS.—Prompt deliveries of black sheets are sought more than ever and just as difficult to secure. The scarcity is more pronounced in No. 27 and No. 28, and for the latter 2.10c was paid in the week. No. 26 is still offered at 1.90c. No. 27 in recent transactions brought 2c. Few mills have sheets for sale, even for October deliveries. Corrugating interests have been the heaviest buyers of late. Sales of galvanized sheets are also fairly numerous, the bulk selling at 80 and 10 per cent off list.

TIN PLATES.—Sales of tin plate are in the main either fourth quarter or 1898 deliveries and prompt plates, where they can be found, are bringing 20c more per box. The canning season is in one respect an agreeable disappointment, and the recent advance in prices on stocked goods is felt in plate. September deliveries of 100-lb. cokes bring $3.15 to $3.25 and later deliveries $3.

PLATES.—The August tonnage in open-hearth and high-grade shell, flange and fire-box plates is stated by Pittsburg mills to be 20 per cent in advance of that of July, while July showed a 10 to 15 per cent advance over preceding months. The question of mill capacity is beginning to affect Bessemer tank, and where competition does not enter in, 1c is the minimum and 1.05c to 1.10c is asked. Quotations follow: Bessemer tank, 1c to 1.10c; open-hearth, 1.05c to 1.10c; shell, 1.20c to 1.25c; flange, 1.25c to 1.30c.

FERRO-MANGANESE.—Domestic is quoted at $45.50 to $46 for 80 per cent.

STRUCTURAL MATERIAL.—The beam capacity is not yet satisfied and neither Pittsburg mill is getting any advance in prices. On good business 1c still holds and 1.05c on small lots; but 1c is a firm minimum. Prices on universal plates and angles are not so flexible, the capacity being smaller. On both 1c to 1.05c is asked. The strike at Jones & Laughlins has interfered with the rolling of smaller shapes, causing annoyance in filling structural specifications. The new freight depot let last week by the Pittsburg & Lake Erie Ry. to the Schultz Bridge & Iron Co. will require 1,200 tons of plain material, which will be Carnegie steel.

IRON AND STEEL SKELP.—With pipe mills all fully occupied, skelp is active and frequent sales are reported. For 500 tons of sheared iron skelp 1.20c was paid. On grooved iron skelp, 1.05c to 1.07½c is quoted; on grooved steel skelp, 95c to 97½c; sheared steel skelp, 1.05c to 1.07½c.

RAILS AND TRACK MATERIAL.—Holders of relaying rails have advanced asking prices in the last few days so that new rails in light sections are as cheap as the stocks offered. The Duquesne Steel Works, after a week on billets, are again on rails. Specifications on contract are heavy. On track material prices are quoted as follows: Splice bars, 1.10c to 1.15c; track bolts, iron, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; links and pins, 1.15c to 1.20c.

PIPES AND TUBES.—The discounts agreed upon at last week's pipe conference held here have since been quoted, as follows: Butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off; butt weld, black, 57 per cent off; lap weld, black, 67 per cent off. Steel pipe, 6 tens; iron, 5 tens and 5 per cent—both quotations being for carload lots. So long as the present heavy demand for pipe continues these prices can be secured with little trouble. Nearly every mill is comfortably filled and concedes but little in taking business. Discounts on boiler tubes are quoted as agreed: 2½-inch, 77½ per cent off; 2 and 2¼-inch, 75 per cent off; 1½-inch, 70 per cent off; 1¼-inch, 65 per cent off. Demand for casing, tubing and pipe for driving is particularly heavy.

OLD MATERIAL.—Iron rails have been the active feature. One lot of 1,000 tons sold for $12 in the valley and for Pittsburg delivery 1,500 tons sold for $12. No. 1 wrought scrap touched $11.50, Pittsburg, for a small tonnage—the most noticeable advance in the week. There is a better market for wrought scrap of all kinds.

IN OTHER MARKETS

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Philadelphia The week shows further improvement in the volume of business—no pronounced demand from any single consuming line, but a good aggregate of orders. The hardening tendency in prices is more noticeable, also. In the pig iron market there is continuous demand, though no heavy orders are reported, and sellers are asking a better price. Foundries are seeking to buy iron in amounts indicating that their consumption in the next six months will be at a greater rate than in the first half of the year. In some instances they appear to be covering against the advance that it seems will not be long in becoming generally established. There are indications that further speculative buying in Southern is pending at New York, but the deal will not be large, as furnaces are chary of tying up at the price which the speculative interest will consider, which is said to be between $6.50 and $6.65 for No. 2 foundry, at furnace. We quote seaboard prices, Philadelphia: No. 1X foundry, $11.75 to $12.50; No. 2X foundry, $10.75 to $11.25; No. 2 plain, $10.35 to $10.65; standard mill iron, $10 to $10.25; ordinary mill iron, $9.50 to $9.75. There is a firm market in steel and a good deal of inquiry. Some sales last week were at $16.75 to $17, but $17.25 is generally quoted to-day, the mills being generally well sold for some time ahead. Mills are gradually increasing the tonnage booked. Schuylkill Valley mills have orders to roll 20,000 tons of skelp for Chester pipe and tube works, the steel being furnished by the Troy Steel Co., of Troy, N. Y. This insures full work for several weeks to come. The Coatesville and Harrisburg mills are also pretty well employed on bridge plates and miscellaneous orders, so that the general situation is very much improved. The Pencoyd, Conshohocken and Phœnixville mills are also all busy on their specialties. We quote on seaboard deliveries: Common bar iron, 1.10c to 1.15c; bar steel, 1.10c to 1.20c; plates, 1.15c to 1.20c; angles, 1.15c to 1.20c; beams and channels, 1.25c to 1.40c.

Cincinnati. The business of the past ten days has been very satisfactory to the producers of pig iron and the brokers handling the material. The volume of the trade has been larger and the inquiries from all sources more numerous than for many weeks. The activity of the rolling mills, steel works and tinplate manufacturers, is a fact recognized by all well informed, and the expansion of business in the multifarious divisions of the general metal interests of the country is being felt and appreciated by all engaged in them. During the week orders for several thousand cars have been placed with the car works, some in the East, but mainly in the West. We quote pig iron as follows: Southern coke, No. 1 foundry, $9.75; No. 2, $9 to $9.25; No. 3, $8.75; gray forge, $8.25 to $8.50; mottled, $8.25 to $8.50; No. 1 soft, $9.50; No. 2 soft, $9 to $9.25; Hanging Rock charcoal, No. 1, $14.50 to $15.70; Tennessee charcoal, No. 1, $12.50 to $13.50; Jackson Co. silvery, No. 1, $12.50 to $13; standard Georgia car wheel, $14.25 to $15; Tennessee car wheel, $13 to $14. In finished material there is a better feeling. More activity is noted in bars and sheets.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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SOME ARMOR PLATE CONSIDERATIONS.

The hope that springs eternal is just now filling up sundry vacant acres in a score or more of "eligible" points about the country, with the immense Government armor plate works which it is assumed are sure to be built. One newspaper says, for example, that "if the united influence of the Senators and Representatives of the State could be secured in our behalf, it is quite probable that the effort to secure the plant might result successfully." A newspaper at the head of Lake Superior, in a region with neither blast furnace nor steel works in operation, sees its city already in possesison of the prize and in an easy, complacent way passes on to the contemplation of the possibilities just beyond, for, mark you, "there is no doubt that it would be the means of attracting other iron manufactories to this point and might eventually result in making this locality the iron and steel manufacturing center of the world!" Certainly nothing could be easier.

It seems to be forgotten in all these rosy calculations, that instead of initiating a campaign of battleship construction, our Government may be really at the beginning of the end of its armoring programme. It is not at all certain, with the rapid changes seen in recent years in methods of naval warfare and defense, that the policy of enormous expenditure for armored vessels will be persisted in by the leading nations. It is almost a demonstration, that no ship can carry armor that will defend it from the latest type of guns, and since the torpedo boat has so multiplied its destructive efficiency, safety lies in speed rather than armor plate. And saying nothing of the evolution in warfare on the seas, it is out of the question for the United States to undertake any such expenditure for naval equipment as shall put her on a footing with Great Britain, for example, with the latter's 66 battleships built and building, her 92 destroyers and her 200 torpedo boats. Our outfit to-day comprises 11 battleships, one destroyer, four torpedo boats built and 15 building. Tax-ridden Europe has already reached the limit of taxation for this burdensome programme of defense, and it is to be presumed that the larger prevalence of the arbitration method will decrease rather than increase the world's expenditure for armament.

The policy which the United States will find most profitable is the building up of her merchant marine, making out of it a reserve for defense should the emergency arise. Never was the need of home-owned merchant bottoms more universally recognized as the great desideratum than just now, when the doors to conquest in foreign markets are opening in so many directions. If one reason for the pre-eminence of the United States to-day, in the production of labor-saving machinery, is that we have persistently cultivated the arts of peace, in contrast with the policy of Europe that has steadily withdrawn young men by tens of thousands from the useful arts to fill the ranks of standing armies, why may we not expect that a consistent policy in respect to naval defense will give like gratifying results? It is merchant vessels rather than war vessels that we stand in need of to-day; and no investment that can be made by the American people, will give larger returns or do more to hasten the return of commercial prosperity.

Back of the rapid changes in naval defense methods, the tendency to reaction from burdensome militarism, and the peculiar incentives the United States now has to the development of merchant rather than war marine, is the much discussed question of the feasibility of Government manufacture of armor plate. We believe the possibilities of low-priced plate have been very greatly exaggerated. The annual amount of armor plate ordered of the Bethlehem Iron Co. in the four years ending March 1, 1897, averaged 1,549 tons. Figuring the plant at $4,000,000 and counting 12½ per cent a year for depreciation, renewals, additions and interest—a reasonable allowance—and the annual fixed charge is $500,000. This alone means more than $300 per ton of product. It should be noted in this connection that the Illinois Steel Co.'s bid at $240 a ton, on a 20-year contract, specified 6,000 tons a year as a minimum output. It can be seen that the probability of a decreasing, rather than an increasing annual requisition for armor plate, will make the cost per ton a very different figure from that which some of the advocates of Government ownership have been figuring.

The strongest reason that appears, then, for restraining lively expectations of local advantages from the proposed Government plant, is that there will be no Government armor-making works.

POOR'S MANUAL for 1897, of which advance sheets have been issued, gives interesting railroad statistics for 1896, and comparisons with the preceding year. The following table summarizes these figures, showing in every item an increase in 1896 over 1895:

	1896.	1895.	Increase.	Per cent increase.
Miles railroad operated.	180,891.19	179,153 62	1,737.57	0.97
Tons freight moved...	773,868,716	755,799,883	18,068,833	2.40
Freight mileage	93,885,853,634	88,567,770'801	5,318,082,833	6.00
Passengers carried.....	535,120,756	529,756,259	5,364,497	1.01
Passenger mileage.....	13,044,840,243	12,609,082,551	435,757,692	3.46
Earnings from freight.	$770,424,013	$743,784,451	$26,639,562	3.58
" from passenger	265 313 258	260,929,741	4,383,517	1.68
Miscell. earnings.....	89,894,754	87,681,245	2,213,509	2.52
Total gross earnings...	1,125,632,025	1,092,395,437	33,236,588	3 04
Net earnings.....	332,333,756	323,196,454	9,137,302	3.23

The gross earnings per ton per mile decreased

from 0.839 cent in 1895 to 0.821 cent in 1896, or 2.15 per cent. The share capital corresponding to the 182,600 miles of road completed at the end of 1896 was $5,373,187,819 against $5,182,121,999 in 1895, or 3.7 per cent increase. The bonded debt at the end of the year was $5,461,856,598, a decrease of 3.17 per cent from the $5,640,942,567 reported in 1895. Reorganizations, with their attendant destruction of liens in excess of purchase price, have caused this large scaling down. The net increase in mileage in 1896 was 1,688 miles. A significant figure in the summary is that standing for the earnings per ton per mile. The steady lowering of transportation rates is an element in the decreased manufacturing costs seen in all industries, and one that promises to be a persistent factor.

THE iron trade has now fairly entered upon a season of larger consumption, and as may be reasonably supposed, of somewhat more remunerative prices. The ease with which healthy improvement develops into an unhealthy boom is only too freshly in mind, but to-day there are no indications that the unpleasant experiences of 1895 and 1896 are to be repeated. The substantial character of the revival in all lines is recognized, and with such exceptional returns guaranteed to the farming community, it would be simply going in the face of all the history of such movements to suppose that the iron industry will not feel the effect of this stimulus for months to come. The outcome of the splendid trade in cereals now enjoyed by the United States, no one can predict; but better prices for iron products are naturally looked for. And that this prosperity may be a sustained, gradually broadening movement, is certainly the desire of the entire trade. Kept free from the restraints of ill-considered combinations, the trade should expand, securing advances by the natural operation of the law of supply and demand. Looking forward to the business of next year, as many are already doing, there must be the extreme of conservatism and restraint on the part of the producers of raw materials, or the prospect that now seems to be opening up will quickly give way to hesitancy, reaction and defeat.

J. D. SMITH, of Cincinnati, president of the Plumbago Club, a long-time mythical, but since the Detroit foundrymen's convention, a measurably real convocation of foundry supply men—has summoned the members to meet in Cincinnati in the latter part of October, at the time of the fall meeting of the Western Foundrymen's Association. The Cincinnati meeting promises to be well attended by foundrymen in Southwestern Ohio.

H. V. Winchell has an article of 24 pages, with plentiful illustrations, in the September number of the *Engineering Magazine* on "Soft-Ore Mining by the Methods of the Minnesota Iron Co." The article is one of a series on "Characteristic American Metal Mines."

OWING to delays in the delivery of new equipment, the rebuilt Bellaire Steel Works cannot resume before Sept. 13. Tin bars will be the product of the mill and a heavy tonnage for 1897 is already booked.

J. G. SIBBALD, sales agent at Montreal, Que., for the Carnegie Steel Co., died Aug. 28 at New London, Conn., aged 62 years. The Montreal sales office was established in January.

THE TIN PLATE MARKET.

The improvement in prices mentioned in our last report has continued, and while the volume of business has not been great, still the general tone of the market is very much better to-day than it was two weeks ago. The market conditions are rather against higher prices than in favor of them, because the canning season is drawing to a close and the demand for tin plates during the next few months will be considerably less than during the past few months.

Western buyers have not taken as much interest in the market as would be expected, and few large contracts have been closed either for nearby or future deliveries; but there has been considerable buying in the East and large unfilled inquiries are reported. While actual prices are not quotable much higher than they were two weeks ago, still buyers concede these prices much more readily and both buyers and sellers alike seem to have confidence in the outlook and the general belief that much better values will be obtainable during the last quarter of this year, even though that is usually a very dull time in tin plate. We quote as follows October, 1897, to July, 1898, f.o.b. maker's mill Pittsburg, or Indiana district:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.60	$4.35
Calland Grade,	3.80	4.55

COKE TINS.

IC, 108, Basis weight,	$3.10
100 lb. " "	3.00
95 lb. " "	2.95
90 lb. " "	2.90
85 lb. " "	2.85
80 lb. " "	2.80

TERNE PLATES.

IC, 216 lb., 20 x 28	$6.05
200 lb. "	5.75

Personal.

H. C. Frick arrived at New York from a European trip on the 27th.

Hon. Abram S. Hewitt, of Cooper, Hewitt & Co., New York, has arrived in England.

J. Y. Mori, vice-president and general manager of the Japan Railway Co., and J. Matsomoto, London representative of Mitsu & Co., a large commission firm of Tokio, have been guests of the Carnegie Steel Co. at Pittsburg the past week. From Pittsburg they went to Chicago.

Walter B. Scaife, son of the late Wm. B. Scaife, recently returned to Pittsburg from Mexico, where he has spent several months studying the language and business customs of the country. He has formed a partnership with H. D. Whittemore, formerly of Chicago, for the carrying on of a commission business in machinery and iron and steel products in Mexico. It is expected that a large trade will be built up in machinery, railroad supplies and architectural iron and steel.

Erastus Corning, one of the foremost citizens of Albany, N. Y., died at his home there Aug. 30, being stricken with paralysis on the preceding day. He was at one time vice-president of the Troy Steel & Iron Co. and had been for a number of years a director of the New York Central Railroad. Mr. Corning's father was the well-known railroad promoter, and on the latter's death, in 1872, the son succeeded him as director in his various enterprises. In 1852 the son was admitted to partnership in the firm of Corning & Co. and in the Albany Iron Works.

Levi Albaugh, general manager of the Eagle Crucible Steel Co., Canton, O., died at that place Aug. 22. He became a resident of Canton on the organization of the company about a year ago.

THE cities of New York and Boston are keeping well in advance in the matter of mail transportation, and are hurrying forward the completion of the pneumatic tube conduits that form part of the Batcheller rapid postal despatch system. To operate the system New York is to have two air compressors with steam cylinders of 13 inches diameter and air cylinders 26 inches diameter by 20 inches stroke; and one compressor with cylinders 10 inches and 24 inches diameter, respectively, steam and air, by 20 inches stroke. Boston is to have two air compressors of the latter size. All five compressors are to be duplex and the Rand Drill Co., of 100 Broadway, N. Y., has the contract for making them.

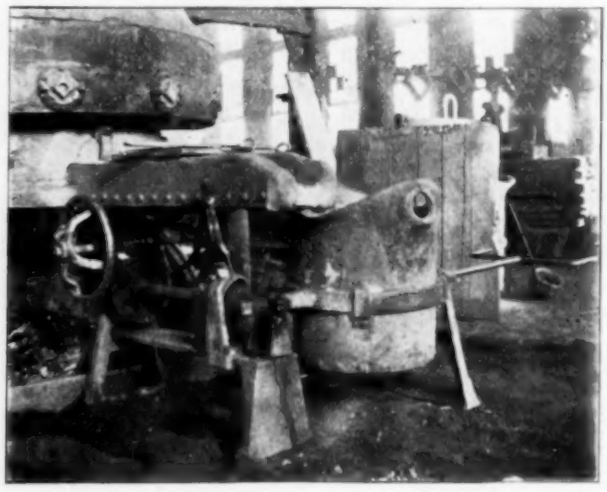
A NEW FOUNDRY MIXING LADLE.

The views given herewith of the foundry of the Porter Foundry & Machine Co., Ltd., of Allegheny, were taken with special reference to the new mixing ladle used in connection with their cupola. The ladle is of a special design made and patented by the company and its work has so far been a decided improvement on that of more cumbersome and less safe devices in use in many foundries.

The ladle itself is not remarkable. The construction is of half-inch plates forming a tank 24 inches in diameter, and 24 inches deep, having a capacity of 1,600 lbs. By means of a three-inch band, however, it is suspended on a two and a half-inch steel shafting supported by three stands. This shafting terminates at one end in a cog wheel which is in mesh with the worm of another shaft. On either end of this second piece of shafting are hand wheels, and by means of the worm and gear wheel the ladle is turned for pouring at will by the cupola man standing on either side of the spout.

While the action of the hand wheel is easy the construction is such that the ladle cannot tilt or turn unless the wheel be operated.

The shafting supporting the ladle is in reality of two pieces spliced by a clutch or sleeve that is thrown on or off by a lever. Thus, when it becomes necessary to use a crane ladle the clutch is thrown back, and, using the middle stand as a pivot, the ladle can be carried out of the way to either side, occupying the position shown in the second view.



A NEW FOUNDRY MIXING LADLE.

Two spouts are provided, being holes on either side near the top. Thus pouring can be accomplished on either side. The ladle is so hung that pouring can take place on either side while iron is being received into the ladle from the spout of the cupola. The spouts are ingeniously flanged so that the top of the spouts skims the slag and refuse from the metal. The spout of the cupola is five feet long. The cupola man also operates the hand wheels and is removed some distance from the point where the metal is poured from the ladle. He is enabled to use an 18-inch tap and bar in directing the flow of metal and can at the same time operate the pouring into smaller ladles.

The stands supporting the ladle and frame work rest on a bottom plate placed low enough to admit the largest ladle.

Wrought Pipe Companies Agree on an Advance.

After much effort, a consultation of the wrought iron and steel pipe interests was held on Wednesday, Aug. 25, at the Monongahela House, Pittsburg. Fourteen concerns were represented, as follows: Pennsylvania Tube Works, Pittsburg; American Tube & Iron Co., mills at Youngstown, O., and Middletown, Pa.; National Tube Works Co., McKeesport, Pa.; Morris, Tasker & Co., New Castle, Del.; Oil City Tube Co., Oil City, Pa.; Reading Iron Co., Reading, Pa.; A. M. Byers & Co., Pittsburg; Spang, Chalfant & Co., Etna, Pa.; Riverside Iron Works, Wheeling; Cohoes Tube Works, Cohoes, N. Y.; Syracuse Tube Co., Syracuse, N. Y.; Ohio Tube Co., Warren, O.; Duquesne Tube Works Co., Pittsburg; Conshohocken Tube Co., Conshohocken, Pa. Edward Worcester, the new general sales manager of the National Tube Works Co., was called to the chair, and Secretary Brown was in attendance. The meeting is said to have been one of the most harmonious ever held. Nearly every mill reported heavily increased tonnage booked and a large volume of orders in prospect. Many are booked ahead for some time and all are comfortably filled.

Under these conditions the decision to advance prices was agreed to unanimously. Butt weld, galvanized, was advanced from 52 per cent off to 50 per cent off, but discounts otherwise are unchanged. On iron pipe the price agreed upon was 5 tens and 5 per cent and on steel pipe 6 tens was fixed, both prices being for carload lots. Discounts on merchant boiler tubes were fixed, as follows: 2½-inch, 77½ per cent off; 2 and 2¼-inch, 75 per cent off; 1½-inch, 70 per cent off; 1½-inch, 65 per cent off. Prices on casing, tubing and drove pipe were also advanced 10 per cent.

Conditions of Successful Rope-Driving.

Rope driving was heralded a few yers ago as being the final solution of the belting question. But while it does make advances it does not seem to be getting ahead with the rapidity that its merits warrant. There may be other reasons for the fact, but it does seem that one of them must be the slip-shod, careless way in which much of the rope driving work has been erected. To use a stiff wire cable on a small, high-speed pulley, and expect satisfactory results is asking too much; to think that because the pulley is grooved and the rope cannot get out, it is a matter of indifference whether the sides of the groove be rough or smooth, is to run counter to the first principles of machine construction which demands a proper care for all details; to show indifference as to whether the rope be stiff or limber is on a par with being indifferent as to whether the journals are lubricated or not. The fact is, rope-driving is rather a delicate operation and the greatest care should be taken that the pulleys are smooth and true, that the groove is of a suitable shape for the rope to be used, and that the latter is soft and flexible. Then rope-driving will be a success, and not unless these precautions are taken.—[J. H. Allen in Dixie.

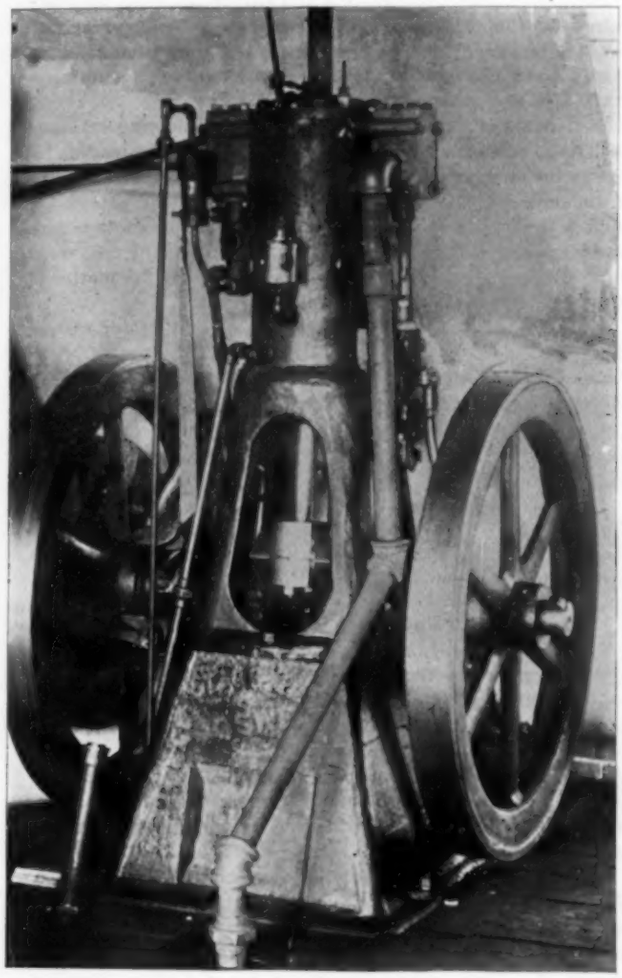
Connellsville coke shipments in the week ending Aug. 21 were 6,692 cars, a decrease of 355 from the preceding week, 200 of the decrease being in shipments to points west of Pittsburg. Of the 6,694 cars, 3,050 went to Pittsburg and river tipples, 2,475 to points west of Pittsburg, and 1,167 to points east of Connellsville. The production in the week ending Aug. 21 was estimated at 123,000 tons, the same as that of the week previous, 11,719 ovens being active and 6,680 ovens idle.

Vanderbilt Furnace, as it is generally known, has just been sold, a Birmingham, Ala., advice says, after five years of idleness. The purchasers are presumably the same company that controls the Mary Lee mines, near the furnace. The original cost was $100,000; it sold for $25,000.

IMPROVED GASOLINE ENGINE.

Starr & Cogswell, of Havana, Ill., have had on the market for the past year, under conditions that have given a thorough efficiency test, the gasoline engine of which an illustration is given below. The arrangement for mixing the gasoline and air in proper proportions in the charge is a special feature of the engine. It insures regular charges, with no chance of an undesigned change through wear at a working point, as might happen where 100 to 200 charges on a lever are admitted per minute, were it not for the study given to this point. The device may, however, be set so as to give regular charges until a certain fixed speed is reached, and then miss charges until the speed slackens sufficiently to take another full charge.

A plain eccentric is employed on the main shaft, whose stem being attached to a reciprocating slide, carrying an alternating wheel. A quick and positive movement of the exhaust valve is secured by this means. Gears, cams, rock-arms,



IMPROVED GASOLINE ENGINE.

levers and lateral shafts are dispensed with. A sensitive governor gives steady motion. An engine of this type in use for electric lighting through the past year has given excellent results, carrying an exceptionally steady light.

Provision is made against any danger from fire or explosion. The gasoline tank may be located outside the building and underground, if convenient. In case of fire or breakage of pipes the gasoline will drain back to the tank. No gasoline is exposed to the air and no body of gas is held in reserve, the mixer admitting the right proportion of gasoline and air into the cylinder just as needed.

The Rosena Furnace, New Castle, Pa., of the Oliver & Snyder Steel Co., Pittsburg, is about completed and it is now planned to put the rebuilt stack in blast about Sept. 10. Remarkably quick time was made in the work of reconstruction, which began July 1.

CONDENSED FROM THE TECHNICAL PRESS.

Behavior of Iron Columns in Fire.—[*Baumaterialenkunde*, July 1.]—H. Schueler describes a number of experiments made with a view of testing columns of various cross sections and with various fire-proof coverings. The columns were about ten feet long and were clamped in a hydraulic press and heated by gas-jets. Various pressures, both tensile and compressive, were used, and the coverings were of concrete, asbestos, and other fire-proofing materials. The results may be summed up as follows: The columns most susceptible to fire were of iron, with an open cross section. They lost their bearing power at 1,100° F., when under a load of 13,700 lbs. per square inch. Next came cast iron columns with a closed cross section which retained their bearing power up to 1,475° F., and 6,800 lbs. per square inch. Under the action of fire, therefore, uncovered columns will not last, while when well covered, they will resist for a long time. M.

Action of Lime and Cement on Iron.—[*Baumaterialenkunde*, July 1.]—The increasing use of iron and steel for building purposes makes the question of the action of lime and cement on them of some interest. Wrought iron bedded in freshly prepared lime is acted upon to a considerable extent; cast iron, not so much. The action consists of a profuse rusting which extends inward; moreover the untouched iron core seems to have its physical properties changed, becoming brittle and weaker. Another danger seems to be caused by the remarkable expansion in volume which goes hand in hand with the deterioration of iron while rusting. Considerable force being exerted as a consequence, as indeed it has been noticed that huge blocks of stone which had been connected by iron clamps set in lime mortar, were thrust asunder and had to be rebedded. Plaster of paris has a similar action on iron, though not so marked; while cement, on the contrary, seems to be an excellent protection to iron. Even under water cement prevents the deterioration of iron to a great extent, and it is therefore recommended where there is any liability of moisture to be present. M.

Melting Metals with Acetylen.—[*Dingler's Polytechnisches Journal*, July 16.]—A note is given on some experiments made in melting metals by means of acetylen gas. The results are said to be very satisfactory, temperatures of 2,700° F., being easily obtained. A batch of nickel was melted in 30 minutes, or in less than one-half the usual time required, and a bunsen burner gotten up specially for the gas could melt a small quantity of copper in a minute. M.

Corrugated Iron as a Roofing Material.—[*Baumaterialenkunde*, July 1.]—Observations made on the subject of corrugated iron roofs for railway stations give the following data: When locomotives were fired with coke, the corrosive action was very rapid, even if the roof was of galvanized sheets, well painted; while with soft coals the action was not so marked. It is therefore important for factories, mills, and other places where open fires are used to have plenty of opportunity given to the gases to escape without damaging the iron roofs. M.

Centrifugal Teeming.—*Stahl und Eisen*, July 15, gives an interesting description of the Huth process of teeming metals in such a way that the surface can be made of hard material while the core may be cast soft. In the well-known chilling process, say as used for making car wheels, we have the chills placed in the mold in such a manner that the metal comes in contact with them, and the result will now depend upon the proper adjustment of the thickness of these chills, combined with the composition of the iron poured, which must be exactly right. This chilling process is, of course, only applicable to a special grade of cast iron, such as for car wheels, chilled rolls, etc., in which the outer portion retains the carbon in the combined form, while the inner material cooling slowly can separate out its graphite and therefore become soft. In the Huth process, however, steel, or any other metal, may be employed, and the *modus operandi* is as follows: A mold is made to rotate and an amount of hard steel is poured into it corresponding to the desired chilled portion. By the action of the centrifugal force the metal at once runs to the

rim, and remains there, filling every crevice. Before this metal has had time to set, a softer grade of steel is poured into the mold, completely filling it. The line of junction of the two steels is very distinct, yet there is perfect union of the metals.

Moreover, the hardness of the rim is uniform and not like the chilled car wheel, hard at the skin, and gradually growing softer towards the gray portion. A number of applications are given, such as car wheels with hard rims, gear wheels with hard teeth, projectiles with hard points, jaws for rock crushers, stamp dies with hard faces, armor plate, plow points, hard surface rolls of all kinds, hard face rails, made of a cast ring cut open and rolled, etc. M.

Retardation of Fusion in Metals.—[*Baumaterialenkunde*, Jan. 24-25.]—Dr. Bischof, of Wiesbaden, contributes a preliminary note concerning the peculiar phenomenon noticed in the melting of metals when under extended pressure. It seems that when a metal is bedded in a mortar of chemically pure aluminum oxide, next thoroughly dried, and then subjected to the necessary heat, a considerable retardation in melting is noticed. For instance, a rod of silver which should melt at 1,830 degrees F., when thus treated will not change its form and melt together until 2,730 degrees F. Palladium, which should melt at 2,730 degrees F., shows no signs of yielding at 2,900 degrees F. It would seem that these rods of metal, unable to expand while in the powerful grip of the aluminum oxide, which contracts on heating, simply cannot melt as they would under normal conditions. The author states that he is engaged in carrying out a series of experiments in this direction with various metals, and promises future reports, which will involve a notation of the actual moment of melting as shown by special electrical contrivances.

Nickel Steel Crank Shafts.—[*Stahl und Eisen, June 15.*]—An illustration and description are given of the crank shaft for the North German Lloyd steamship Kaiser Wilhelm der Grosse, made by Krupp. This crank shaft is built up in four sections; each has one crank. It is made of nickel steel, is 92 tons in weight, and about 45 feet long. The ultimate strength of the nickel steel is 85,000 lbs. per square inch, and it has a 20 per cent elongation. It must be understood that with nickel steel the strength and ductility do not represent all the valuable points of the material. The special excellence is found in the fact that it combines all the good qualities of a high grade steel with the fibrous nature of wrought iron. It is therefore not so liable to sudden fracture in emergency cases as the other steels would be. The same paper also gives a picture and the details of a triple crank shaft for the steamer Kaiser Friedrich which is also of great interest. The article concludes with a quotation from a recent speech of prince Henry in which he says: "While much foreign material still enters into the construction of this proud fleet (referring to the Hamburg American) yet I feel confident in stating that soon every steamer will be completely German from keel to flag staff." Truly unpalatable words for the American iron trade. M.

THE Tin Plate Manufacturers' Association at its meeting held at the Hotel Anderson, Pittsburg, Thursday, Aug. 26, elected Berthold Goldsmith, of the Pennsylvania Tin Plate Co., of New Kensington, Pa., secretary of the association, to succeed I. Cryder Lea, of New York. Aside from this action and the auditing of accounts, little business was transacted.

THE Walworth Run Foundry, Cleveland, burned down early on the morning of Aug. 31. The fire is thought to be incendiary. The loss is $20,000 and insurance $17,000. Buildings and equipment are a ruin and about half the company's patterns, with a considerable stock belonging to its customers, was destroyed.

A NASHVILLE, Tenn., dispatch notes the closing of a contract by the Tennessee Central Railway Co. with the Carnegie Steel Co. for a considerable tonnage of rails and track supplies. The work of construction will begin at once and contracts for grading, bridge-building and track-laying are now pending.

THE Cleveland Rolling Mill Co., Cleveland, has moved its offices from the second floor of the National Bank Building to the Western Reserve Building, in which it now occupies the entire fourth floor.

LAKE SUPERIOR IRON MINES.

Ferdinand Schlesinger, of Milwaukee, has bought all the stock of the Newport Mining Co., owners of the Newport mine, a well-known Gogebic range property. The principal stockholder was J. J. Gill, the Steubenville, O., glass manufacturer. The Newport began to ship ore in 1886 and its total output up to this year was 1,105,332 tons; that of 1896 was 142,369 tons. It was originally known as the Iron King. The average output in recent years has been about 150,000 tons, but it is the intention of the new management to increase this to upwards of 250,000 tons. Some of the Newport ore is manganiferous, running as high as seven per cent in that element, this being the highest percentage shown by any of the Lake Superior ores. For some time the Newport has been closed, with the exception of the Bonnie shaft. It was opened last week and 75 new men put at work. Others will be added. The report that M. A. Hanna is one of the purchasers of the Newport is incorrect. No change is announced in the sales agency of the ore, which continues in the hands of Oglebay, Norton & Co.

The report that the Carnegie and Oliver interests have acquired the Tilden mine on the Gogebic range is incorrect. It is true, however, that representatives of the Pittsburg companies have been on the Gogebic range recently, examining the Tilden and other properties.

The miners of Ishpeming, Mich., at their meeting on Sunday, Aug. 22, decided against the proposal of their leaders to go out on strike for the unionizing of all the working forces at the mines. The leaders, however, wanted an expression from a larger number of the union men, and another vote was taken on Sunday, Aug. 29. It showed that the men were three or four to one against going out, and thus the matter is effectually disposed of.

Striking miners at the Crystal Falls mine on the Menominee range returned to work after two weeks of idleness. The scale of wages ranged from $1.25 for surface men to $1.65 for contract miners, and was the same as that paid at other mines in the vicinity. The men demanded a horizontal advance of 20 cents a day, which was refused. They have returned to work on the old basis.

The contract has been let for the construction of a spur of the D. M. & N. Railroad to the Pillsbury mine, three miles from Hibbing, Minn. This is the latest property to be taken up by the Consolidated company, for active operation.

Publications Received.

The *Canadian Manufacturer*, of Toronto, Can., in a recent edition prints the full text of the 1897 Canadian tariff act, the Dingley bill as passed, the British tariff, the British merchandise marks act and the Newfoundland tariff. The issue is thus a valuable one for preservation.

A pocket edition of the metal schedule of the Dingley tariff has been issued by the American Iron and Steel Association. It is bound in flexible cloth and is in convenient form for ready reference.

Wire and chain machinery, the specialty of the Turner, Vaughn & Taylor Co., Cuyahoga Falls, O., is illustrated in a pamphlet recently issued by the company. The manufacturers furnish plans and machinery for the full equipment of wire mills. The illustrations shown are of a wire annealing furnace, continuous side-bar and continuous chain draw-in rod frames, galvanizing frames, 16-in. and 20-inch frames and 8-inch fine frame for finishing, straightaway chain bench, Standish chain hammers, post and link cutters, link winders, etc. A number of pages are added, giving tables of pitch, breaking, proof and working strains for chains, various standards of wire gauge, twist drill gauges, decimal equivalents of Stubs' steel wire gauge, etc. The machinery described in the booklet represents the accumulated experience of the 41 years this establishment has been in existence.

The latest catalogue of Hyde Bros. & Co., Pittsburg, illustrates the applications of the Hyde boiler, particularly in the utilization of waste heat at rolling mills and blast furnaces. The boiler has been described in these columns, and efficiency tests have been given. In the present catalogue the manufacturers summarize the results of an experience of several years, and present data of tests at the plants of the Coleman-Shields Co., Niles, O.; Ætna Standard Iron & Steel Co., Bridgeport, O.; Spang, Chalfant & Co., Etna, Pa., and Moorhead, Bro. & Co., Sharpsburg, Pa.

SPECIAL FACTORY MOTORS.

The growing demand for motors of machine shops and factories to drive tools and machinery of all kinds, and the confidence in their efficiency which has resulted from their successful use, has created a call for special designs which will permit of their being put, without much additional cost, in out of the way places so as to occupy little room and if possible no floor space at all. To meet this demand, the Card Electric Co., of Mansfield, O., has brought out the motor shown in the accompanying cuts (known as the manufacturer's S type), which can be set on the floor, or supported from a post or wall, or suspended from the ceiling.

Fig. 1 shows the motor with a bracket support for fastening to a post or wall. By changing the position of the armature bearings, that is, turning them one-half round on the pole frames, the bracket will be brought above the motor, which will then hang down. When the driving belt is to run horizontally from the motor or nearly so, this style of support is desirable, since the belt tightening screw is in the best position for quick adjustment.

The style of base shown in Fig. 2 is adapted to support the motor on the floor as shown in the cut, or by changing the position of the armature bearings, in order to keep the oil

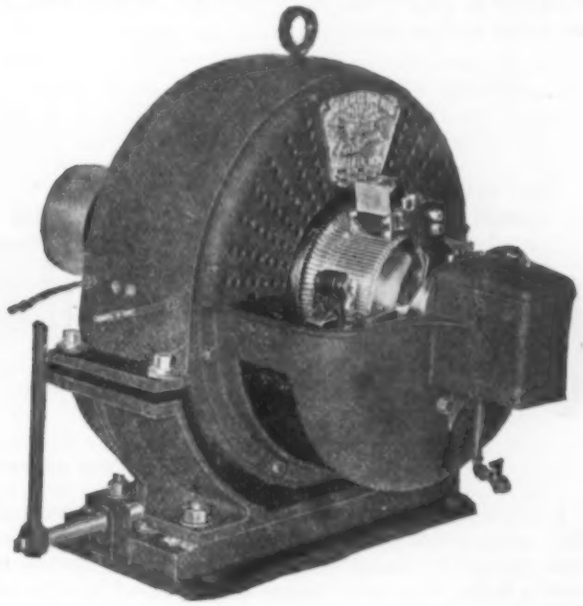


FIG. 1.—SPECIAL FACTORY MOTORS.—FIG. 2.

boxes right side up, from the wall or ceiling; and when the belt is to run nearly vertical this style of base is better than the bracket for wall support because of the better position of the belt tightening screw. It is obvious that these motors can be used to drive shafting by gears as well as by belts when it is desirable to do so. As motors of this kind are frequently fastened to iron girders or posts in buildings and therefore grounded, protection to the armature and field coils is provided for in the construction, by heavy insulation between the pole frame and base. In all other ways care has been taken to insure rigidity and lasting qualities. These motors are made in sizes up to 15 horse power.

Chainless Wheels.

There is a general belief that one of the large bicycle concerns is preparing a chainless surprise for the next season. It has sent out a circular descriptive of a recent hill-climbing contest at Catford Hill, Eng. Of the 13 skilled riders who started only two reached the top, and then H. J. Herbert astonished the crowd by riding backward up the hill on a chainless machine, which, after all, may not have shown the superiority of the machine. Prof. Carpenter has made a comparative test of the two systems, and of ten different chain machines, the poorest of the lot showing less friction than the chainless wheel. But he had not got hold of the chainless machine which is still coming, and questions of strength and wear are probably of greater importance than minute differences of friction.

We are inclined to believe that it is not going to prove so easy to supplant the chain as many people suppose, and that the extreme refinements of gear-making that are so much referred to in connection with cycles do not go well with a non-rigid frame, which is what a bicycle frame must be if it is of ridable weight. We also think that when it has been demonstrated that gears afford a better means of transmitting motion from cranks to rear wheel than a chain does, it will not be at all difficult to produce the gears of a quality fully up to the requirements of the case.—[American Machinist.

Modernizing the Colorado Steel Plant.

The annual report recently submitted to the stockholders of the Colorado Fuel & Iron Co. exemplifies practically the process of "modernizing" the equipment of iron and steel works that is continually going on:

"The expenditures on the iron and steel plant at Bessemer, since the organization of the company, Oct. 21, 1892, have been quite heavy, but were rendered necessary by the condition the plant was in when received from the Colorado Coal & Iron Co.; this was fully realized at the time of the consolidation and provision was made for an increased bond issue, in order that the plant could be put in order for more economical operation to meet the competition and conditions then existing. The capacity of the plant has been more than doubled in all departments, and costs have been reduced from 25 to 75 per cent. The net earnings of the plant have been increased from an average of $50,000 per annum prior to consolidation, to an average of $264,000 per annum during the four years and eight months since consolidation or more than five-fold. These results would seem to fully justify the wisdom of the expenditures. There is still necessity, however, for more radical improvements; the blooming and rail mills are old-fashioned and have none of the labor-saving devices of modern mills, the cost of production being influenced so largely by the tonnage produced makes it advisable to add new lines of manufacture to use the products of the blast furnaces, converter and blooming mill and enable them to be run more steadily and economically. While the distance from competing plants gives the company a large protection in freight rates for the territory heretofore supplied, the advantages of increased tonnages, in reduction of costs, makes it advisable to reach more distant markets, where the freight advantage is reduced or entirely wiped out. In the matter of rails, which furnish our principal tonnage, we cannot expect to sell any large amount to lines reaching Chicago or St. Louis, at little, if any, higher price at Pueblo than they would have to pay at their Eastern termini."

NEEDED REFORMS IN PATENT LAWS.

At the second annual convention of the National Association of Manufacturers, held in Philadelphia, Jan. 26–28, 1897, the subject of "Patents and Patent Laws" was referred to in the address of the president, Theodore C. Search, and was also discussed by the convention. It was finally resolved that on account of the great importance of patents, trade marks, copyrights, etc., to the business interests of the country, the matter should be referred to the executive committee, which committee authorized the president to appoint a committee to gather information relative thereto, and to report at the next annual meeting, with such recommendations as the investigations might warrant. The president appointed P. W. Gates, C. F. Quincy and Wm. C. Barker, and this committee after consultation, decided to issue a circular letter, asking of those interested their views in relation to the matters touched upon, as well as any suggestions on any other matters which might properly belong thereto. The chief points as given in the committee's circular, are as follows:

First. Should the Government not charge an annuity on patents, trade marks, copyrights, etc., in order to invalidate such patents as are not considered by the owners of sufficient value to warrant the annuity, but which, nevertheless, stand a menace to new and useful patents for fear of infringement? A very large proportion of the patents in force are of little or no value to the owners, and are not being made use of, but which, nevertheless, are often found to contain some element making it necessary to procure their control in order to avoid possible litigation or infringement by patents of later date, the merits of which make them desirable to work, both for the owner and the public.

It was suggested that a small annuity would clear from the field such patents as the owner did not consider of sufficient value to warrant the outlay, and at the same time furnish an income to the Government which might be used to advantage in the Patent Office.

Second. The fact that foreigners are allowed to procure patents in this country and hold them without further expense or trouble than the first cost, while our citizens are obliged to pay annuities in many foreign countries, often amounting to many hundreds of dollars during the life of the patents, and also in many cases being obliged to work the same at intervals, entailing further great expense, was commented upon, and it was suggested that laws should be passed making annuities and working obligatory on all patents granted to foreigners the same as their respective governments charge our citizens.

Third. The advisability of having separate courts for adjudication of patents, trade marks, copyrights, etc., and if not, whether any changes should be made in the present procedure in order to shorten the time necessary to litigate.

Fourth. The desirability of any change in the Patent Office proceedings relative to procuring patents.

Fifth. The practicability or desirability of having an international agreement whereby a patent allowed in one country may become operative in any other country party to the agreement, upon payment of proper fees, and also to fix upon a uniform charge and practice in relation to government fees, annuities, working, etc.

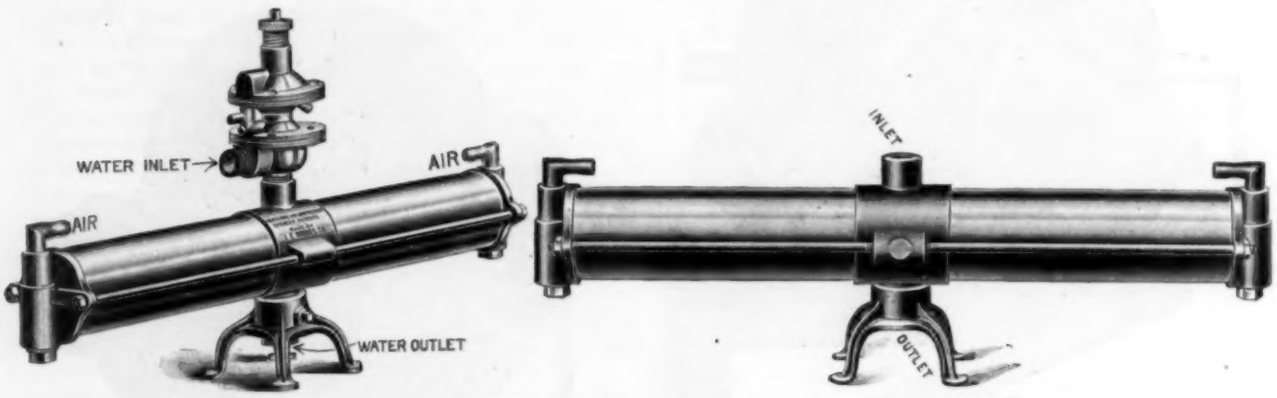
Sixth. What action, if any, can you suggest that this government should take with countries that allow goods to be imported and sold within its borders that are marked or represented as having been manufactured in the United States, and sold under American names, trade marks, and brands, but which in fact, were manufactured in some country other than the United States?

The committee feels that if any of these changes be desirable they can be brought about by the recommendation of the association, only when aided to the fullest extent by the business public interested in these matters, and the members therefore feel that it is necessary that the sentiment of the United States be ascertained in relation to these matters, and also the sentiment of foreign countries in relation to such parts as affect their interests.

Early communications are solicited and should be addressed to "Committee on Patents and Patent Laws of the National Association of Manufacturers, No. 650 Elston ave., Chicago."

THE HARTFORD AIR COMPRESSOR.

A type of hydraulic air compressor adapted for use on ordinary water service pipes and to supply compressed air at a constant pressure but in comparatively small volume has been devised, as shown in the accompanying cuts. It finds a place in systems of heating and ventilation; in the driving of small pneumatic tools; in the pumping or forcing of liquids; and in other situations where small power is needed. The compressor is made by the L. E. Rhodes Co., of Hartford, Conn. There are few parts, no valve packings and the valve itself is very simple. With no waste air spaces to consume power and no weights or auxiliary cylinders necessitating an intermittent action, any waste of either water or air is prevented,



THE HARTFORD AIR COMPRESSOR.

and with the whole force of the water utilized on the piston, an air pressure can be obtained equal to the water pressure.

Other forms of this compressor are made where the pressure of the air is higher than that of the water, but here an additional amount of water must be consumed to compensate for the extra force obtained. A noteworthy feature is the system of regulating. It has ordinarily been the practice with such compressors (whenever an air pressure lower than the water pressure was desired) to reduce the water pressure by some regulating device before the water enters the machine and so indirectly attain the desired air pressure. This system results in a loss of speed, for the whole force of the water is not available to move the pistons rapidly when the demand for air comes, and as the water pressure is always bearing on the compressor, there is a great chance for leakage. By the system adopted by the L. E. Rhodes Co. the water is shut off entirely when no air is being drawn. As air is used, the regulator automatically opens and allows the maximum water pressure to bear on the pistons, insuring such a quick action that the desired air pressure is immediately regained in turn, causing the regulator to close. Constant strain on the pump is avoided, with consequent leakage, for when the pump is not working the water is shut off as if by a faucet.

THE Maryland Steel Co. has secured a contract for a quantity of steel billets for tool making and other purposes, which will go to English concerns. In addition to this, the steel plant may get an order for a quantity of rails to be sent to the Island of Madagascar for a railroad to be built there.

COMPOSITION OF SOUTHERN IRONS.

Its Relation to the Export Trade.

BY WM. B. PHILLIPS.

It may, I think, be assumed that most of the pig iron exported from the United States this year will be of Southern origin. The statement made in a previous article in this paper that the exports this year may be 250,000 tons was based on the fact that during the first six months of 1897 the shipments from Alabama alone were about 120,000 tons. At this rate this State will send out very nearly 250,000 tons herself. But allowing for a reduction in Southern tonnage, the exports are not likely to fall below 250,000 tons for the entire country. Just how much of the tonnage of the first half of the year was shipped on specifications as to composition is not known, but it is not probable that any considerable amount was sold under guarantee. The purchasers were glad to buy and there was not much evidence of coyness on the part of the sellers. There may have been, and doubtless was, more or less inquiry from abroad as to composition, but this point was not pressed, the general understanding being that the iron should equal certain well known brands of Scotch or English make. Southern iron producers are not without information as to the composition of their products, and,in some places a close watch is kept over the cast-house, and iron-yard. That they have been unwilling to enter into contracts based on the composition of their irons, except basic iron, has been due far more to their reluctance to introduce a new factor into the trade than to lack of information.

But there is one feature of the case that deserves careful consideration, and that is the effect of demands as to composition upon the regularity of the product. There is nothing like a good, wholesome pressure from outside to bring furnacemen up to the full measure of their powers. There was not a little hesitation when the first contracts for basic iron were undertaken, and one of the causes of this hesitation was the reflection that nothing of the kind had been attempted here before. It was a new thing that large contracts should specify the composition of the iron, giving maximum limits for silicon, sulphur and phosphorus. No one thinks of it now, for the venture was successful and nothing succeeds like success. But two years ago the idea was new, and did not meet with the favor it now enjoys.

Now, aside from the production of this iron as a factor in the steel trade, there is another view of the matter that seems to me to be even brighter and better. That is, the confidence that has been gained in the ability to handle irregular stock in the production of regular iron. The success with basic iron has done away with the belief that Southern furnaces could not make iron of uniform quality, and if now we hear complaints as to foundry and mill grades it is because consumers do not want uniformity and cheapness combined. It seems to be enough that iron should be sold at prices lower than those of any other district, although I for one can not regard it as an unmixed good that prices have been forced so low. But foundrymen and mill men are content to save in the price and take their chances as to quality. They do not stop to reflect that in many cases products offered at low prices must be sold at any price. In this lies the menace to the Southern iron trade, viz., the inability to turn the tide, to force prices up when they have for so many years been diligently forced down. Article after article has appeared to show the very low cost at which iron can be made in the South, and the writers did not stop to consider that they were doing an injury to the trade at large in impressing upon the market a belief that floods of cheap iron were about to be turned loose. Furnace after furnace was built, many of them so closely united to real estate "booms" that even at this distance and after the disintegrating effects of hard times, it can scarcely be told where the furnace began and the corner lot left off.

Well, the mischief has been done, and if there be a remedy it will be found, not in an attempt to increase prices, but in the determination to better the product. It is not likely that we shall again see the high prices of 1887. The era of low prices, large sales and small margins has set in to stay, and we may as well make up our minds to face the situation. We may not increase prices, but we can always improve products, and a better product, if indeed, it does not command a better price, has at any rate the great advantage of holding its market.

Perhaps the time has not yet come for insisting that ordinary grades of iron shall be subjected to the same trying scrutiny that maintains over iron destined for the steel furnace. We may, indeed, waive this point, and cheerfully allow that they should not be. But at the same time it is right and proper that ordinary iron should not vary excessively in its composition. Take, for instance, No. 3F. A great deal of this grade and of No. 4F. has been sold for foreign delivery. It is in foreign markets that they meet with the severest competition, because the difference in the cost of laying them down there and the selling price there is less than in the home market. If there is any market to which the best goods should be sent it is where competition is most severe. We may get along in almost any clothes at home but when we go abroad we must put on the best we have. No. 3F. of Southern make is a very good iron, provided it is No. 3, and not some other sort masquerading in No. 3's clothes. If the silicon in normal No. 3 is two per cent, with an allowable variation of 0.25 per cent, above and below, what is the sense in grading as No. 3 an iron of over three per cent silicon, and in cases of nearly 3.75 per cent? I have known cases where 40 per cent of the iron, graded as No. 3F. over a considerable period, carried more than 2.50 per cent of silicon, and 16.5 per cent of it carried more than 3.0 per cent. In No. 4F., which may be allowed a variation of 0.25 per cent above and below 1.75 per cent, I have known nearly 64 per cent to carry more than 2.0 per cent of silicon, 30 per cent to carry over 2.50 per cent, and 20 per cent to carry over 3.0 per cent.! That is, in the case of No. 4F., one-fifth of it had as much silicon as No. 1S should have, and nearly one-third of it as much silicon as No. 2F. or No. 1F. should have. In respect of the other ingredients there was no such marked discrepancies, and as the iron was supposed to be graded on its silicon content nothing further was required.

Now, what can be said as to this state of affaris? The two irons were going into the home market, and into the foreign market as well, and yet they were improperly graded, and did not fairly represent Southern irons of uniform quality. Certainly no one can claim that an iron with over three per cent of silicon is No. 4F., or any foundry grade. It is a soft iron and no matter what its color, fracture, strength, granulation or face it should never go out as anything but a soft iron. How can a steady market be obtained for iron subject to such variations in composition? Only by stress of circumstance; and on the return of normal conditions abroad it will be more and more difficult to maintain prices.

The growth of the export trade in pig iron has been very great and very encouraging. It holds out peculiar inducements to Southern furnaces and has already relieved a serious congestion. But there is a side of it that can not be neglected if it is to continue its prosperous career. The iron must be inspected with the utmost care, and a uniformity of composition graranteed and strictly observed. If the South is to fulfill its promises as one of the great iron and steel districts of the world it can do so only by insisting upon the application of the most stringent specifications as to the quality of its products.

Birmingham, Ala.

RAPID development of our torpedo boat fleet is probably the cause of the Navy Department again directing attention to the question of using oil fuel. The secretary of the navy has ordered Lieut. Nathan Sargent to proceed to the oil fields of Pennsylvania to pursue investigations along this line. It is said that plans for special machinery to be applied to one of the new torpedo boats at the Newport station will depend largely upon Lieut. Sargent's report regarding the kind of petroleum fuel that is at command.—[Marine Review.

NOT a little of the expense in brazing is due to the cost of removing the brass which has stuck to the metal where it is not wanted. The removal of this brass is usually attained only by patience and diligent filing; but graphite has lately come to the aid of the brazier—Dixon's flour of graphite, a sample of which will be sent without charge by the Joseph Dixon Crucible Co., Jersey City, N. J., the manufacturers.

MANUFACTURE OF TIN PLATES IN WALES.

BY GEO. D. HAMMOND.

The manufacture of tin plates is carried on in Wales as follows: The rough bar from the steel works, of suitable gauge, varying from one-quarter inch to three-quarter inch thick and seven inches to 10 inches in width, are cut into short lengths corresponding with the width of the plate to be produced, and are placed in the first or thick iron furnace, and when heated to redness are delivered to the roller, who passes each piece several times between the roughing rolls; the catcher, stationed behind the rolls, catches the pieces as they pass through, and returns them over the top roll. When sufficiently extended the pieces are replaced in the same furnace, and heat equivalent to that lost in the operation of rolling is restored. When they are again extended by rolling, the doubler doubles the two ends of each piece together, flattening the piece under the squeezer, by which it should be observed the substance for resistance in the next operation of rolling is not diminished. In this stage the pieces are known as "doubles." The doubles are now charged into the second or finishing furnace, leaving the thick iron furnace free to heat another charge of rough bars while the operation of finishing the former is continued.

When the doubles are heated the pieces are again extended, the second doubling is performed, and the uneven ends are cut off at the shears, "fours" being thus produced. The packs are again subjected to the action of the finishing furnace and prepared for final rolling, or the process is continued after further rolling or doubling to "eighths," as may be necessary for the gauge required. It is customary in every instance after two or more thicknesses of double plates have been rolled together to separate them before reheating, care being taken to replace the pieces in position in the pack; this avoids welding of the surfaces and facilitates the final separation or opening of the finished sheets. It is known that each piece of rough bar of given weight, if carefully manipulated, will produce so many sheets of the desired size and gauge, and considerable skill is required to obtain sufficient length and at the same time to avoid exceeding it, or the steel would cut to waste. When the roller is satisfied that he has obtained the above requirements, the pieces are placed on trolleys for conveyance to the finishing shears, and when cool are cut by the shearer into the sizes of the order in hand.

The next process is that of opening or separating the plates pressed together by the final rolling; for this girls are employed, who do the work by hand, separating sheet from sheet with much dexterity. In this state the plates are known as rough blackplate. A machine, for which a big future seems possible, has lately been invented by Messrs. Williams & White, for opening or separating blackplate or sheets. The machine consists essentially of two pairs of rolls, all driven at the same circumferential speed, and placed with their axes all parallel to each other. Between the first and second pair of rolls is placed a "waved guide," consisting of hard, smooth, chilled iron plates. These plates are firmly held at a proper distance from each other, and the "guide" formed by the two plates is firmly held in position between the two pairs of rolls.

The action of the machine is as follows: The packs or unopened blackplate to be opened by the machine are passed through the first pair of rolls. From these they pass through the sinuous passage of the guide plates. After leaving the last bend or curve in the guide, the second pair of rolls seizes the plates and draws the packs through, completing the operation. After leaving the second pair of rolls the packs fall on a trolley, where they accumulate until wheeled away for the next process. It may be explained that the individual sheets comprising the pack are held together by very thin films of oxide of iron, which forms on the surface during the working of the sheets while hot. As the packs are forced around the curves of the waved passage, the sheets of metal and the films of iron oxide are bent to and fro. This bending to and fro is harmless as far as the metal is concerned, but it is destructive to the films of oxide, hence the cementing medium is destroyed, and the sheets are separated. One machine is capable of opening the work from four to five mills.

The average capacity of an efficient modern tin-plate mill is 40 to 50 boxes—of 1 cwt. each—in eight hours; but until recently, under their union rules, the workpeople have been restricted to an output of 36 boxes. This cannot, however, be upheld, as the only hope for Wales to retain a hold on the trade is to obtain big makes and to produce cheaply. The wages paid in the mills, known as the "1874 List," are as follows:

Roller, 3s. 5d. per dozen boxes = average of 10s. to 13s. per turn.

Doubler, 2s. 9d. per dozen boxes = average of 8s. to 10s. per turn.

Furnacemen, 2s. 7d. per dozen boxes = average of 7s. 6d. to 9s. 9d. per turn.

Catcher, 1s. 3d. per dozen boxes = average of 3s. 9d. to 4s. 9d. per turn.

Shearing, 1s. 1d. per dozen boxes = average of 10s. to 12s. per turn.

Openers, 6s. 3d. per 100 boxes = average of 2s. 3d. to 2s. 9d. per turn.

Black pickling is necessary to clean the oxide of iron formed by the action of the air on the heated surface of the plates in the mills, and is now universally done by means of machines provided with cradles, in which the plates are packed on their edges in bulk, for immersion first in diluted sulphuric or hydrochloric acid to remove the scaly oxide, and afterward in water to wash off all traces of acid. The plates after leaving the pickling machines are placed in piles or iron stands, and are covered over with inverted iron or steel boxes called pots, sand being used around the mouth to exclude the air. The boxes with enclosed plates are then subjected to a mild flame in a large reverberatory furnace for 8 to 10 hours, and are then allowed to cool gradually, the object being to soften the plates, that they may be more easily polished in the preparation for tinning.

Cold rolling consists in passing the plates one by one when cold three or four times between highly polished chilled rolls working under great pressure, and is necessary to remove any buckle or unevenness from the plate, and to produce a flat, bright, polished surface for receiving the coating of tin. The plates are hardened by this process, and it is necessary to give them a second or white annealing, the plates being treated in the closed pots as before, but subjected to a milder heat. In former times the tinning process was performed by soaking the plates in the molten metal, and afterward arranging them on edge in a rack fixed in the grease pot to allow the surplus tin to drain off them, the thickness of the coating being determined to some extent by the length of time the plates remained in the hot grease.

In the process as introduced by Mr. Morewood, the wet plates from the swilling-troughs of the white pickling machine were immersed, sheet by sheet, by the tinman, 25 to 30 at a time, in a bath of melted palm oil to absorb the moisture on the surface of the plates, and then removed and dipped into a series of pots containing molten tin at various temperatures; and after being brushed, one at a time, on both surfaces by the washman with a hempen brush, they were conveyed by him to the grease pot in which the rolls revolved. The plates, on issuing from the rolls in a vertical direction, were raised by a boy and placed in a rack, from which girls removed them to dip in iron, for the purpose of removing grease adhering to the surface. They were afterward polished by slightly rubbing with a duster of sheepskin or other soft material, by which the coating operation was completed. For years past attempts have been made to economize on this method, and to employ chloride of zinc as a tinning flux in substitution for palm-oil in the first pot, but the results for some time were not satisfactory. It is now in general use, and by its means the operation of coating is much more rapidly effected and a brighter finished plate is produced.

From this change may be dated the successful introduction of mechanical tinning pots, by which further savings are effected in material and the services of the washman are dispensed with. These mechanical tinning pots, now known in the trade as "patents," are of various makes, the variations consisting principally in detail, each maker claiming some advantage for his machine over that of others. They may, however, be divided into two classes, in one of which the plates travel vertically, and in the other in a half-circular direction from the flux, through the tin, and into the rolls revolving in the grease box end. Of the former type, those of Messrs. Thomas, of Melingriffith; Daniel Edwards, of Morriston, and Thomas & White, of Llangennech, and of the latter, those of Messrs. Taylor, Struve & Co., of Briton Ferry, and Player, of Clydach, are well-known machines.

[*] Abstract of a paper read before the Cardiff meeting Iron and Steel Institute, August 3d, 1897.

ALUMINUM-BRASS AND ALUMINUM-BRONZE.*

BY ALFRED E. HUNT.

Aluminum has been used quite largely in improving the quality of brass castings. Brass is a mixture of copper and zinc, as distinguished from the bronzes which are alloys of copper and tin. The proportions commonly used in making brass are 66 parts copper, 34 parts zinc. It is customary in the manufacture of ordinary commercial brass to introduce from two to five per cent of tin for the purpose of giving added strength and density.

The terms "high brass" and "low brass" are used in the trade, but apply only to rolled material. High brass is composed of two parts copper and one part zinc, being a light color. Low brass is composed of 75 to 88 per cent copper and 25 to 12 per cent zinc, and in color is considerably darker than high brass. In ordinay commercial practice, cheap brass is a very heterogeneous material, much of it containing lead and some iron alloyed with it, either accidentally or for the purpose of giving an additional weight of cheap metals. Aluminum has been added to brass with advantage in giving a stronger alloy. It has been used in all proportions from one-tenth of one per cent, to 10 per cent; and the best results have been obtained by introducing the aluminum in the form of aluminized zinc. This is added in the same manner as zinc is ordinarily introduced into the copper, and in such proportions as will give the requisite amount of aluminum in the brass mixture.

The effect of aluminum in brass, added in this manner, in small quantities of less than one per cent, is mainly to make the brass flow freely and present a smooth surface, free from blow-holes. When used in these quantities, from one-half to one-third more of small patterns can be used on a gate than can be used without the presence of the aluminum, for this amount of aluminum gives the brass such additional fluidity as to cause it to run more freely in the molds and to a greater distance; consequently more patterns can be used on a gate. In quantities of over about one per cent, the effect of the aluminum commences to be very perceptible, from the fact that it imparts to the brass additional strength, and this strength is increased directly as the percentage of aluminum is increased, up to about ten per cent. One per cent of aluminum in brass is very extensively used for electrical purposes, as it gives a brass casting free from pin holes and of greater strength than can be secured otherwise, from the same grade of brass. It follows, therefore, that by the use of a small percentage of aluminum in brass, a cheaper grade of brass can be used to do the same work than would otherwise be possible.

In all cases, if maximum results are desired, care must be taken that only pure metals are used. In connection herewith, it should be clearly understood that much of the copper and zinc commonly used contains considerable amounts of impurities, and the nature of some of these impurities is such as to absolutely prevent the production of good alloys with aluminum. In all cases, we would advise intending purchasers to insist on being furnished with an analysis of the metal supplied, and for aluminum alloys, to exclude all containing more than one-fourth of one per cent of iron, arsenic, or antimony, or more than two-hundredths of one per cent of bismuth. Alloys should be poured at a low heat as soon as fluid.

ANALYSES OF METALS.

	Best Copper.		Tough Copper.	Bad Copper.	Good Tin.	Bad Tin.		Good Zinc.	Poor Zinc.
Copper	99.861	99.84	99.67	98.04	98.02			trace	
Tin	.0				98.60	95.55	95.80	.020	
Zinc	.0	trace						99.656	98.76
Silver	.053	.061							
Lead	.017	.0			.034	.567	3.04	.158	1.09
Bismuth	.0	.0	.015					.0	.03
Iron	.030	.0	.018		.09	.812	.714	.093	
Nickel	.039	.05							
Arsenic			.177	1.27	1.40			trace	trace
Antimony			.0		trace	2.58	.121	.0	
Sulphur		trace						.073	
Oxygen		0.26							

It should be noted that the presence of aluminum in these alloys lowers the point at which they become fluid, and that they are fluid at lower temperatures than either gun metal or ordinary brass mixtures; therefore the average brass founder is very liable to overheat them, and great care must be taken to prevent this.

To illustrate the great differences which occur in metals found in the open market, the table in the preceding column gives analyses of metals, some of which are good and others worthless for making good alloys:

The use of aluminum in cheap ordinary brass mixtures has sometimes occasioned the complaint that the surface of the brass castings is made black by the addition of the aluminum. This is due to the sweating out of the lead from the brass mixture, which the impure brass has contained.

It is not advisable to use aluminum in brass which is to be dipped in acid, as the aluminum, even in small quantities, makes the metal withstand the action of the acid so completely that the dipping is not successful. For this reason brass, which is subject to corrosion, is found to withstand this corrosion much better if it contains a proportion of aluminum, up to, say, 10 per cent. The main objection to the considerable addition of aluminum to brass is the increased shrinkage of the alloy occasioned by the use of the aluminum. This has to be provided for by pouring the metal not too hot and using large gates and risers.

Aluminum brass has an elastic limit of about 30,000 pounds per square inch and an ultimate strength of 40,000 to 50,000 pounds, with an elongation of three per cent to 10 per cent in eight inches.

The use of aluminum bronze is gradually increasing, for purposes where a strong and dense metal is required. On account of the difficulty of making sound castings, and especially in rolling ingot-slabs capable of turning out sound sheets, the business has grown much more slowly than the bright prospects claimed for the use of aluminum bronze eight or ten years ago would seem to indicate. It is necessary now in the preparation of rolling slabs of aluminum bronze that each ingot shall be planed off on the top until sound metal is obtained below the blow-holes, which always exist on the surface of the castings. This planing of the metal is expensive, due to the hard, dense character of the metal.

In the manufacture of aluminum bronze, the best results will be derived by following closely the following method of manufacture: Both the copper and the aluminum should be carefully selected, and none but the purest "Calumet and Hecla Mine" or "Lake" copper should be used and the aluminum should be guaranteed to be at least 99 per cent pure. The copper should be placed in a plumbago crucible, and melted over a charcoal or coke fire; these being the best fuels to use. Next to charcoal or coke, as a fuel for melting, comes oil, and then natural gas or producer-gas. It is impossible to make satisfactory aluminum bronze over an ordinary coal fire, for the reason that the copper will absorb the gases from the coal. The copper should be covered with charcoal to prevent as far as possible oxidation and the absorption of the gases, as there is always the liability of a small amount of gases being present, even in using the fuels previously mentioned.

After the copper has been melted, and the time has arrived to introduce the aluminum, the crucible should be grasped with tongs in order to remove it from the fire instantly, and the percentage of aluminum which it is desired to add dropped into the pot through the charcoal.

In large pots of bronze, the pot may be removed from the fire before adding the aluminum. As soon as the aluminum goes into the pot, the first action, to a certain extent, will be a cooling one, caused by the actual temperature of the aluminum; but as aluminum and copper form natural alloys, (*i. e.*, combinations in atomic proportions), the aluminum, as soon as it is heated to its melting temperature, enters into combination with the copper, by which a large quantity of latent heat is set free (or made sensible) by the chemical union of the two metals, and consequently the temperature of the mass is raised. If the mixture be watched, one can tell as soon as union takes place, for the reason that the copper will become more liquid, and also turn a little brighter in color.

This occurs in an instant after the aluminum is introduced; then, if the crucible has remained on the fire, it should instantly be removed, the charcoal skimmed from the surface, and the metal, which is now aluminum bronze, poured into molds of any convenient size, keeping the liquid metal in agitation by constant stirring until it is poured, in order to insure

*From an address before the Franklin Institute, Philadelphia.

that the aluminum is as well disseminated through the alloy as possible. If these points are strictly adhered to, good castings can be produced.

After this aluminum bronze has become cold, it should be re-melted and poured into molds as desired, for the purpose of manufacturing finished castings. Aluminum bronze is found to improve with each successive re-melting and casting, until this has been accomplished three or four times, for the reason that it seems to give the aluminum a better chance to become more freely disseminated, and form a more uniform alloy with the copper.

The amount of aluminum in aluminum bronze varies from a few per cent up to 10 or 11 per cent, depending on the purpose for which the metal is intended. The strongest mixture contains between 10 per cent and 11 per cent of aluminum. Beyond this point, the bronze is hard to work, and becomes brittle.

Aluminum bronze can readily be soldered. In soldering this alloy no such difficulty is encountered as is found in soldering pure aluminum. The best method of soldering aluminum bronze is to use pure block tin with a flux made from zinc filings and muriatic acid. It is well to "tin" the two surfaces before putting them together.

SECTIONALIZED MACHINERY.

We made a note in our issue of July 24th of the conditions of erecting mining and metallurgical machinery, in extremely mountainous countries like Mexico and many parts of South America, and the skill with which American machinery manufacturers had adapted their designs to meet these conditions. The mischances which have happened to concerns who have placed orders in Europe for this purpose and to European firms which have filled them are numerous and amusing to every one not directly interested. They are amusing because they are due to careless ignorance; on the part of the buyer, ignorance that the firms dealt with have had no experience in such kind of work and on the part of the houses filling the order, gross ignorance of the places to which their machines were destined and the transportation difficulties which had to be overcome. These additional remarks are prompted by a recent incident communicated to us by a correspondent in Peru.

A company operating there determined to erect a crushing mill, and the chief member of it, a German, insisted on placing the order in Germany, although a bid (not yet received) had been asked for from the United States; incidentally it may be mentioned that when the latter arrived the price was $350 less than what had been contracted in Germany. There was a still greater surprise in store for the purchasers, however, since when the German machinery, which had been specifically ordered for mule transportation, was unloaded it was found to embrace timbers 16 by 24 inches, by 24 feet, weighing 800 pounds. This was destined to go by a trail which led over the *cordillera*, at an elevation of 16,000 feet to a *quebrada*, on the other side 7,000 feet lower, over which no mule could carry more than 300 pounds, nor any piece longer than six feet.

A similar case came recently under our observation in Mexico, where a stamp battery, timber and all, had been sent out from England. It was to be erected for an English company, and the order had been placed with a home manufacturer by the London office without consultation with the officers at the mine. The mine was 10 freighting days from the railway terminus, without a vestige of a wagon road. At last accounts the local officials were still puzzling their brains as to how the main battery frames were to be transported thither.—[Engineering and Mining Journal.

Gain in Net Railway Earnings.

The record of net railroad earnings during the second quarter of the present year has been one of slow but gradual improvement, hampered and delayed in some sections by the failure of gross receipts to show expected enlargements. It is hardly necessary to say anything about the trade and business conditions ruling during that period, but if these conditions are considered the progress made can hardly be regarded as unsatisfactory, and it is a fact that the six months' showing, as a whole, has been improved by the results of operations during the spring and early summer months. When it is considered that the six-months' exhibit, as a whole, marks a gain in both gross and net earnings over the corresponding period of 1896, that year in turn showing a gain over 1895, the outlook for the future can hardly be regarded as other than hopeful, particularly as the usually more active period of the railroad year is now at hand. At the end of the first quarter of this year aggregate earnings of the leading railroads of the country showed a decrease in gross receipts of nearly two per cent from 1896, with an increase in net earnings slightly exceeding three per cent. At the end of the six-months' period, we find that the decrease in gross shown at the end of the first quarter has given place to a fractional gain, while in net earnings the three-months' increase has been still further augmented. This, it may be mentioned, is true of the railroads as a whole. In some sections receipts of gross and net have fallen off, but gains made elsewhere have more than made up for the discrepancy.

Total earnings of 129 companies this year aggregate $380,603,155 a gain of three-hundredths of one per cent. On the other hand, net earnings of the same roads aggregate $107,876,740, a gain over 1896 of 4.8 per cent. The latter year showed in increase for the six-months' period over 1895 in gross receipts of 4.2 per cent, and in net receipts of 3.5 per cent, so it will be observed that no ground was lost during the first six months of the year, and that the progress, while small, is none the less encouraging.—[Bradstreets.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Warrior Machine Works, Birmingham, Ala., want air compressors, second-hand, in good condition.

The Salem Iron Works, Salem, N. C., want specifications and prices on a good 10 or 12 h. p. boiler and engine, with hoisting outfit for drawing logs out of swamp. With this outfit is wanted drum or cylinder that will take about 600 or 800 feet of ¾-inch wire rope.

At the office of the Supervising Architect, Washington, D. C., sealed proposals will be received until 2 p. m., Sept. 16, for furnishing all the labor and materials required for the low pressure, return circulation, steam heating and ventilating apparatus for the U. S. Post Office and Custom House Bldg., at New London, Conn.

The Pennsylvania Automatic Signal & Alarm Co., of Pittsburg, capital $10,000, has been chartered. The directors are John C. Miller, F. S. Kay, R. H. McLaren, F. W. Hartung, of Pittsburg, and J. K. Davidson, of Allegheny.

The Union Tube & Iron Co., of Howland township, Trumbull Co., O., has been incorporated by C. D. Hine, W. DeP. Knowlton, C. F. Garrison, Warner Arms and F. M. Peet. Capital stock, $50,000.

American Air Motor Co. has been incorporated in New Jersey, with a capital of $75,000, to manufacture engines for operating cars by stationary engines, compressed air, steam or electricity. The incorporators are: Lucius T. Gibbs and Robert M. Thompson, of the Orford Copper Co., New York, N. Y.; Clarence C. Garrison, Bayonne, N. J.

The Barker & Chord Machine Tool Co., Cincinnati, has been organized, with a capital stock of $10,000, by William Barker, Nicholas D. Chord, Jessie Chord, Lena Barker and W. H. Burtner. The company will manufacture and sell iron and brass working machinery.

The Buffalo Bolt Co., Buffalo, N. Y., has been incorporated to manufacture nuts, bolts, and screws and bolt and nut making machinery; capital, $500,000. The directors are Ralph H. Plumb, Robert C. Board, and Herbert H. Hewitt, of Buffalo.

The Alabama Foundry & Machine Works, Decatur, Ala., have been incorporated with $50,000 capital. A plant has been bought at New Decatur, and hay presses, cotton cultivators and other agricultural implements will be manufactured.

The Consolidated Roller Bearing Co., of Newark, N. J., have been organized to manufacture and sell roller bearings. The incorpoators are James D. Mattison, East Orange; Alfred O. Dunk, New York; James M. Schenck, New York.

New Construction:—

The contract for the iron work on the Brooklyn bridge which it is necessary for the trolley roads to construct was let yester-

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HARRISON SAFETY BOILER WKS., PHILA., PA. HARRISON SAFETY BOILER WKS., PHILA., PA.

day to Geroge H. Thomson & Co., of New York City, for $360,000. Work must be commenced before Sept. 1 and it is to be completed within four months.

The Shiffler Bridge Co., of Pittsburg, has commenced building the new plant of the Landis Tool Co., at Waynesboro, Pa.

A company has been formed to build a steel and strip mills on the land of the Leechburg (Pa.) Land & Improvement Co., at the west end of the Leechburg bridge. It is composed mostly of Leechburg capitalists with the following officers: President, Capt. A. Hicks; vice-president, J. W. Kirkpatrick; treasurer, J. L. Kirkpatrick.

The Schultz Bridge & Iron Co., of McKees Rocks, gets the contract for the erection of the new Lake Erie freight depot at Pittsburg. The estimated cost of the building is about $250,000. It will be a steel and iron building throughout, 200x400 feet in size.

The new works of the Canton Pump Co., Canton, O., will be 315 x 70 feet. Improved machinery will be installed and larger space provided for foundry and pattern works.

At Jacksonville, Fla., John G. Christopher will erect a three-story machine shop.

The James Clark Co., Baltimore, contemplates the erection of an extensive new plant at a cost of $25,000. The plant will include machine shops, blacksmith shops and boiler works; main building will be 151x70 ft., which will be joined by another structure 153x65 ft., both buildings to be 48 ft. in height. Electric cranes and other modern devices will be introduced in the plant, and a large number of new machines added.

The Gillette-Herzog Mfg. Co., Minneapolis, has a contract to build for the Golden Gate Mills, Mercur, Utah, seven steel buildings, 75x29 ft., 82x75 ft., 64x98 ft., 96x294 ft., 33x29 ft., 60x294 ft., 50x70 ft. This contract includes a number of tanks and ore bins and a steel machine shop. The same company has the contract for a steel blacksmith shop and a boiler house for the Anaconda Mining Co., Butte, Mont., and a boiler house for the Boston & Montana Co.

The Standard Boiler & Bridge Co.'s new plant at Bellaire, O., is about completed.

New machinery is being put in shop G at the arsenal, Moline, Ill., for the new rifle factory the Government will erect there. The factory will employ 600 to 700 men.

At West Superior the board of directors of the American Steel Barge Co. has authorized the erection of a machine shop as an addition to the present plant. The machinery is partly purchased. The new shop will be designed particularly for the repairing of marine engines. The company is also negotiating for more modern and improved machinery for use about the drydock. This will consist principally of pneumatic machines for caulking, reaming and drilling.

A modern foundry will be erected on the new site purchased by Baker Bros., at Toledo.

The Excelsior Foundry Co.'s plant, at Bay City, Mich., is being pushed rapidly to completion.

Sealed proposals will be received by the City of Chicago, until 11 a. m., Sept. 6, 1897, for furnishing and erecting on the foundations to be constructed at the 68th street pumping station in Chicago, a horizontal compound condensing pumping engine of 14,000,000 gallons capacity per 24 hours, with a total lift of 150 feet, together with necessary boilers and appurtenances according to plans and specifications on file in the office of the Department of Public Works.

Additions, Enlargements, Removals, Etc.:—

The Brush Electric Co., of Cleveland, has lately made the final shipments of its manufactured and raw materials, machine tools, etc., to the East, to be used in its manufactory there. This is interesting to those familiar with the history of the pioneer company in electric lighting, in the United States. The works belonging to the company, located on Mason and Belden sts., Cleveland, are now partially occupied by tenants engaged in metal working and other manufacturing, and some extensive and finely equipped shops are still to be let. Doubtless some large manufacturer will avail himself of the opportunity to use this factory.

The Schoen Pressed Steel Co., Pittsburg, is doubling the capacity of its plant by the erection of three steel buildings of the following dimensions: 600x120 ft., 400x120 ft., and 325x90 ft. The new buildings will be equipped with machinery of the most modern design, and includes seven electric cranes hydraulic presses, punches and riveters. When the additions are completed they will have about six acres under cover, and capacity for making 500 tons of pressed steel shapes daily.

The Paul E. Berger Mfg. Co., heretofore located at 11 South Water st., Chicago, and engaged in the manufacture of small machinery, model, and pattern making, etc., has just purchased for $40,000 the entire grounds, buildings, stock, and machinery of the Chicago Ridge Stamping Co., and Paul E. Berger is now the sole owner of this plant. The main building is a substantial brick, mill construction, 120x50 feet, 60 feet high, with an engine room 20x40. The annealing house is 20x30 feet, and is included in the purchase, and a tinning house, 40x60 feet, for the manufacture of tin plate. To this the Paul E. Berger Mfg. Co. has added an iron and brass foundry, 60x80 feet, carpenter shop, lumber shed, and a storehouse, 20x60 feet. The Berger company has moved its entire factory to this plant, which includes five acres of land.

The plant of the Washington Steel & Tin Plate Co., Washington, Pa., resumed last week. During the summer an addition doubling the output of the plant has been built, at an expense of $40,000. The rolling mill has had added to it an extension 120x100 feet, a new wareroom 100x40 feet has been erected, and also a tinning house, 40x60 feet. A new 400-h. p. engine with a 32-foot fly wheel has been placed in the new part of the plant, and also a train of rolls duplicating the former train. The plant is now a nine-mill plant. These improvements have given employment to more than 100 additional workmen.

Fires and Accidents:—

The main building of the Anniston Pipe & Foundry Co.'s plant at Anniston, Ala., burned Aug. 29. The pits and cranes, two cupolas, core ovens and all other equipment were ruined. Fire was communicated from a core oven. The loss is heavy, partly covered by insurance.

An incendiary fire destroyed the two story frame building

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of the Cleveland Axe Co., Cleveland. The building was occupied by the Biddle Purchasing Co., whose loss will amount to $1,000. The loss of the Cleveland Axe Co. is placed at $1,500.

At Attalla, Ala., the plant of the Attalla Foundry & Machine Co. burned; estimated loss, $10,000.

Fire at the Enterprise Brass Mfg. Co.'s plant, Louisville, Ky., caused $5,000 loss.

J. T. Johnson's Stove Foundry, at Decker, Ind., was destroyed by fire. Loss, $5,000; no insurance.

In the burning of a three-story building at Anderson st. and the Ft. Wayne Railroad, Allegheny, Pa., the Illinois Steel Rolling Door Co. lost a considerable amount on machinery and stock.

General Industrial Notes:—

The Fulton Steam Boiler Works, of Richmond, Ind., reference to whose business appears on another page, have just completed an order for 25 car tanks. They build steam boilers in batteries from two upwards. They have erected and in operation plants of their make with 24 boilers under one roof, taken as one order. They are now finishing a lot of annealing boxes, some of which are welded and others riveted. With a plant well equipped for plate and other construction work, the company solicits orders for riveted steel pipe for conveying either water or air.

An Altoona, Pa., dispatch says: The Pennsylvania Railroad is preparing to compete with the new Carnegie road in the ore hauling trade by putting on the Pittsburg & Erie system a line of monster freight engines and cars, all controlled by air brakes. The first of five big freight engines intended for this purpose will leave the Juniata shops on September 20. The cars will have a capacity of 100,000 pounds. The engines will have twice the hauling capacity of the ordinary class R freight engine, the boiler 72 inches in diameter, 34 feet long, containing 318 flues and carrying 210 pounds of steam. It is expected to haul 45 loaded cars over the Pittsburg division. The heaviest engines now haul 20 cars each.

The Thomas Furnace Co.'s furnace at Niles, O., will soon go in blast.

The Troy Steel Co.'s third furnace at Breaker Island will soon blow in.

The Rockdale, Ill., plant of the Consolidated Steel & Wire Co. is being much improved. There are 100 barbed wire machines and as many nail machines. The plant may not be started, however, until next spring.

President Gates, of the Illinois Steel Co., is thus quoted: "Illinois Steel Co. has felt return of good times. Our business

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1—No. "D" Horizontal Boring & Drilling Machine.
1—Garvin Profiler.
1—A. T. & M. Co. Valve Milling Machine.
4—No. 11 Brown & Sharpe Milling Machines.
2—No. 1½ Stiles Presses.
1—No. 3 Stiles Press.
1—36-in. G. & E. Spur Gear Cutter.
2— Crank Planers.
3—No. 1 Brown & Sharpe Screw Machines.
2—No. 6 Brown & Sharpe Screw Machines.
1—36-in. Car-wheel Borer.
1—55-in. Pneumatic Riveter.
1—30-in. Pulley Lathe.
1—Pratt & Whitney Turret Lathe.
1—109 in. Engine Lathe.
1—15-in. Fox Turret Lathe.
1—20-in. Lodge-Davis Turret Lathe.
1—20-in. x 10-ft. Gleason Engine Lathe.
1—24-in. x 12-ft. Gleason Engine Lathe.
1—3-Spindle Drill Press.
2—30-in. Drill Presses.

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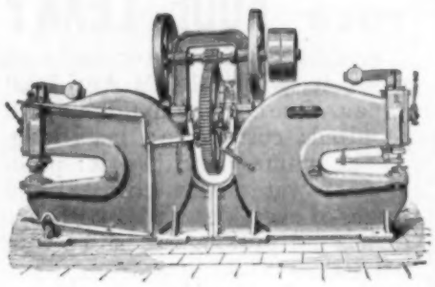
For Iron and Steel Furnaces,
Glass Furnaces, etc.
SPECIAL SHAPES MADE TO ORDER.
DIAMOND FIRE BRICK WORKS,
AKRON, OHIO.



THE LONG & ALLSTATTER CO.,
HAMILTON, OHIO,
MANUFACTURERS OF
POWER PUNCHING AND SHEARING MACHINERY.
Belt, Steam or Electrically Driven.
For Heavy or Light Work.

this year will be three times that of 1896, twice that of 1895 and more than 1894. Wheat and corn are booming, farmers are prospering, steel and iron, and in fact all trades, picking up. Demand for labor will increase and we believe prosperity is on all sides of us and here to stay."

The annual report of the Colorado Fuel & Iron Co., shows that the net earnings from operating departments were $813,385.14, an increase of $92,474 50 over the preceding year. The net earnings of the fuel department show an increase of $128,165.66, while the iron department shows a decrease of $17,800.49. The total net earnings from all sources amounted to $825,020.14, which provided for all fixed charges, sinking funds, and other expenditures, leaving a balance of $280,326.58, from which a dividend of four per cent on the preferred stock, amounting to $80,000, was paid Feb. 20, 1897, and the balance of $200,326.58 was carried to the credit of profit and loss. The resources and liabilities of the company are as follows: Resources, $2,236,742.03, classified as cash and convertible assets; cash liabilities, $534,121.12. Included in the cash assets is $180,000 due from the Railmakers' Association.

The Missouri Furnace Co.'s stack at Carondelet, Mo., inactive for 15 months, will resume operations.

The Michigan Iron Works, Manistee, Mich., idle for a number of years, have been started up by Fitzgerald & Meyer.

The Lebanon Mfg. Co., Lebanon, Pa., has orders that will keep its foundry department busy for months.

Contracts recently taken will require the Portsmouth (O.) Foundry & Machine Works to run night and day.

The Lansing (Mich.) Boiler & Engine Works have taken liberal orders recently and are very busy.

A. Henley, president of the Consolidated Barb Wire Co., Lawrence, Kan., says of the revival of demand in that industry: "This is the first time in years that we had to run our mills during July and August to fill orders on hand. We are running full capacity night and day both here and at Joliet, and can't begin to supply the unprecedented demand for both wire and nails at this time. Last year one turn of men working less than half time could easily supply the demand. Now we are crowding the work to its utmost capacity. As soon as one man quits another takes his place. It is no trouble to sell goods now, and in carload lots. The trade of Western Kansas alone has more than doubled. Collections have improved wonderfully, and no more worry about losses from business failures. We are employing 150 men here now and could use as many more if we had the capacity."

John Lavelle & Son's brass foundry at Anderson, Ind., has recently turned out some very large castings, consisting of bearings for tin mill rolls.

Wm. Sellers & Co., Philadelphia, Pa., will, it is reported, furnish two 20-ton electric cranes for the Schenectady Locomotive Works.

Wm. B. Pollock & Co., Youngstown, O., through D. B. McClelland, of New York, is shipping to Mexico, a consignment of 22-inch riveted steel pipe for the construction of a siphon for the water supply of Licheria.

The Northwestern Iron Works, Mayville, Wis., have started up with 150 hands.

A Warren, O., dispatch says that the Union Tube & Iron Co., recently incorporated, will take the product of the skelp department of the Falcon Iron & Nail Co., Niles, also the output of the Ohio Tube Co., Warren.

At Sharpsville, Pa., Claire furnace, whose product is taken by M. A. Hanna & Co., is being put in readiness to resume, after being out of blast for a year.

The New Castle Tin Plate Co. is adding two mills to its equipment, making 20 in all.

The Corns Iron & Steel Co., Massillon, O., resumed last week and will run steadily, with about 200 men.

Tin plate workers at New Castle, Pa., decided to work on Labor Day, the company requesting it on account of the pressure for deliveries, and all the wages earned in the day will be given by the men to aid the striking coal miners.

The Etna Foundry & Machine Co., Warren, O., shipped in

August two cars of mill castings to the Beaver Tin Plate Co., Lisbon, O., and two cars of mill castings to Muncie, Ind. An order was received from the Whittaker Iron Co., of Wheeling, for doubling and squaring shears for its new mill.

The 60-day option given to stockholders of the Siemens & Halske Co., Chicago, to exchange their holdings for stock of the Pennsylvania Iron Works Co., of Philadlphia, on the basis of one preferred share of Siemens-Halske for one and 3-20th preferred shares of Pennsylvania Iron and one share of Siemens-Halske common for 3-20th of a share of Pennsylvania Iron preferred and 10-13th of a share of Pennsylvnia Iron common have expired. In round numbers 75 per cent of the stock of the Siemens-Halske Co. was thus exchanged. While no official notice has been given, it is understood that the remaining Siemens-Halske stock will be given a further opportunity to come in on the same basis. Enough Siemens-Halske stock accepted the propositon to assure the success of the consolidation. For the present there will be no change in the corporate forms of the two companies—that is, the Siemens-Halske Co., will continue just as before, the Pennsylvania Co. holding that portion of its capital stock which has been exchanged for Pennsylvania Iron stock. Ultimately there may be a more complete merger of the two corporations. At the Siemens-Halske works the output has been somewhat enlarged. The company has sold five locomotives since the consolidation was set afoot.

At a meeting of the creditors of the Valentine Iron Co., of Bellefonte, Pa., representing 60 per cent of the indebtedness of the company, it was agreed to extend to Jan. 1 time of payment on the company's indebtedness.

The Allentown (Pa.) Iron Co. expects to blow in one of its idle furnaces at Allentown early in September.

Locomotive and car building: Japan Government asks bids on 30 locomotives. The Canadian Pacific has ordered 10 locomotives from the Baldwin Locomotive Works. The Big Four road will soon order 1,000 freight cars. The C. & O. has asked bids on 1,000 box cars. Nelson Morris & Co., Chicago, will buy 100 cars. The Michigan Peninsular Car Co. has an order for 500 cars from the Canadian Pacific. Ohio Falls Mfg. Co. is building 40 cars for James Lawes & Co., Cincinnati. Northern Pacific is building 100 freight cars.

The Union Iron & Steel Co., Youngstown, O., has started up its Girard mill, which had been idle for months and had run but little in three years.

The proposals for machinery and machine tools to be furnished for the naval station at Port Royal, S. C., have resulted in the selection of machines to be supplied by the Niles Tool Works, the Davis & Egan Machine Tool Co., Manning, Maxwell & Moore, and the Hilles & Jones Co.

The extensive bolt and nut plant of Plumb, Burdict & Barnard, at North Tonawanda, N. Y., for a time in the hands of a receiver for months has been sold to J. J. Albright, of

"Metallurgy of Cast Iron,"

By THOS. D. WEST; 107 engravings, 583 pages. Just issued. A valuable work to Founder, Molder, Draughtsman, Designer, Technical School Specialist. Chemistry of Iron; cheaping of mixtures; the effect of the metalloids in changing the grade of iron; latest improvements in cupola construction and practice—all are fully covered. Price $3. Sent postpaid on receipt of price, by *The Iron Trade Review Co.*, Cleveland, O; 1142 Monadnock Block, Chicago, Ill.

James M. Swank, author of "Iron in All Ages," and editor of the *Bulletin* of The American Iron & Steel Association, in reviewing "Metallurgy of Cast Iron," says it is "One of the most valuable publications relating to the manufacture of iron castings, that has ever, to our knowledge, been issued in this or any other country."

DOES YOUR ROOF LEAK?

If an old leaky tin, iron or steel roof, paint it with Allen's Anti-Rust Japan. One coat is enough; no skill required; costs little; lasts long.

The name describes it; proof against water, time, climate, and fumes of every description. Stops leaks, and prolongs the life of an old roof.

If you want evidence write us. To be returned at our expense if not satisfactory.

This Anti-Rust is also of highest value in protecting metal pipes, fans, etc., at mines, exposed to the corroding effects of *mine air* and *mine water*.

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AUTOMATIC CIRCUIT BREAKER COMPANY, NEWAYGO, MICHIGAN, U. S. A.

Buffalo, for $225,000. The plant, which has been idle since last May, will be started almost immediately, giving employment to 500 men.

The Haskell & Barker Car Co.'s Works, at Michigan City, Ind., has posted a notcie that sufficient orders have been received to run the plant 12 hours daily for an indefinite time.

The Illinois Steel Co. has at length signed the Amalgamated scale for its Bay View Wis., plant. The new 9-inch mill has been put in operation for the manufacture of cotton ties. The 8-inch mill, the old 9-inch mill and the 12-inch mill are also in operation. The new reducing mill, in which defective rails of standard section are reduced to smaller size, is doing a large business. The output is from 125 to 200 tons every 24 hours. This is one of the finest mills in the world for this class of work. The rails when finished are from 25 to 40 lbs. weight to the yard, and they are shipped to every portion of the country, to the extreme West and South and to Canada.

The two Bay View furnaces of the Illinois Steel Co. are in blast, one on foundry iron and the other on soft iron.

The Central Iron & Steel Co.' s plant, at Brazil, Ind., after a months' inactivity on account of shortness of coal, is again in operation. The company's nut and bolt works are being finished and a mill for the manufacture of steel spikes after the process of L. B. Atchison, of Chattanooga, is going up.

Mileage Tickets—Notice to the Traveling Public.

The new One Thousand Mile Ticket (Rebate form) of the Central Passenger Association, interchangeable over more than twenty thousand miles of railroad, will be placed, on sale at principal offices of the Pennsylvania Lines west of Pittsburg, on Wednesday morning, September 1. The sale of present form of mileage ticket will be discontinued on and after August 31.

THE Magnolia Metal Co., of New York, announces that Herbert G. Torrey and J. Gray Torrey, his son, have no connection whatever with its business, their relations with it having been severed April 15 last. The Magnolia Metal Co. recently had both these persons arrested, also their attorney, Abraham Cornish, on the charge of breaking into its factory at Stirling, N. J., in the night and destroying property and carrying away tools. The arrests were the result of a contest between the parties. H. G. Torrey, who is U. S. Assayer for the District of New York, had been superintendent of the Magnolia Metal Co.'s works and his son a foreman. When they left the company's employ, they sought to get a lease of the works, which are the property of the D. L. & W. R. R. Believing he had secured the right to manufacture in the plant, Torrey served a notice on the Magnolia Co. to vacate, and followed this up by going at night and effecting an entrance by force.

LOW RATES.

Via Pennsylvania Lines.

Special reductions in fare over the Pennsylvania Lines will be granted for numerous events to take place this summer in various parts of the United States, in addition to local excursions. Some of the points to which tickets will be sold and dates of sale are as follows:

To Nashville, Tenn., daily to October 15th, for Tennessee Centennial and International Exposition.

To Indianapolis, September 8th and 9th, for National Encampment Sons of Veterans.

The reduced rates over the Pennsylvania Lines will not be restricted to members of the organization mentioned, but may be taken advantage of by the public generally. Excursion tickets may be obtained at ticket offices on the Pennsylvania System and will be sold over this route by connecting railways. Any Pennsylvania Line Ticket or Passenger Agent will furnish desired information concerning rates, time of trains, return limit, and other details to all applicants, or the same may be obtained by addressing C. L. Kimball, Assistant General Passenger Agent, Cleveland, O.

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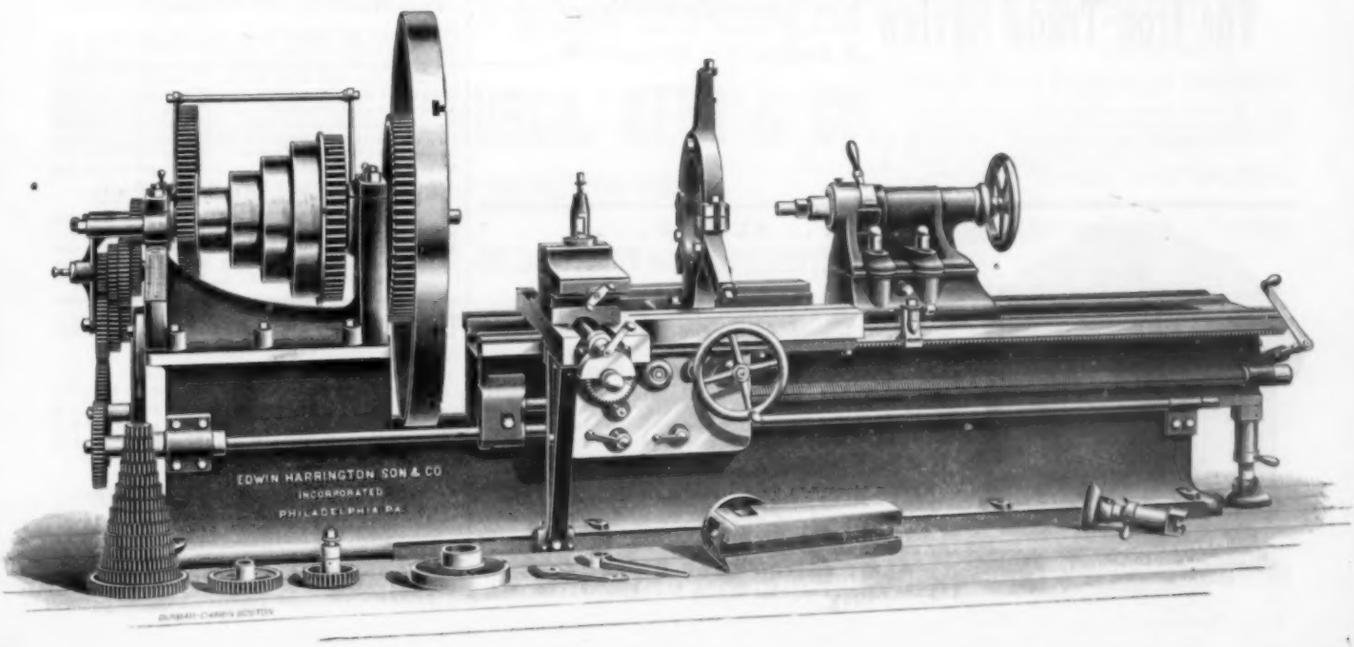

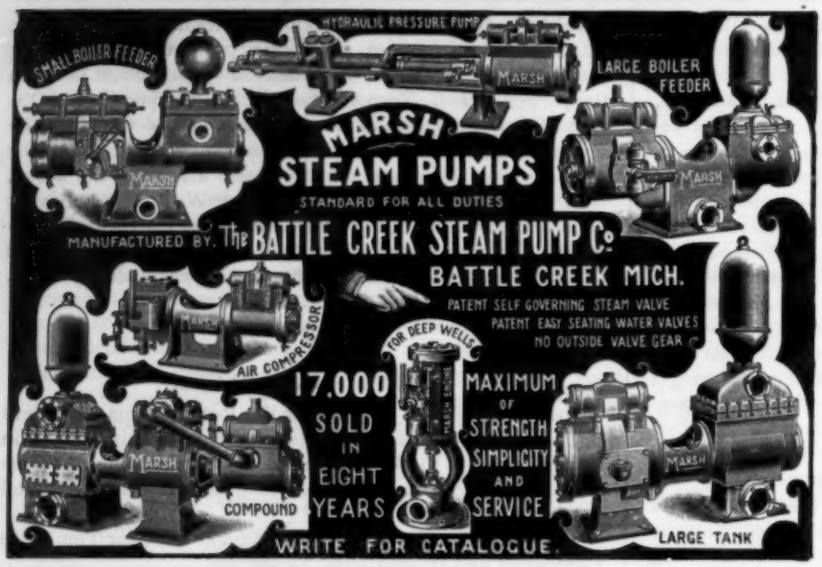

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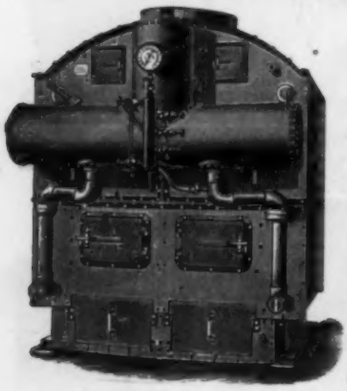
The Iron Trade Review

is an increasingly valuable medium through which to sell equipment to machine shop and foundries.



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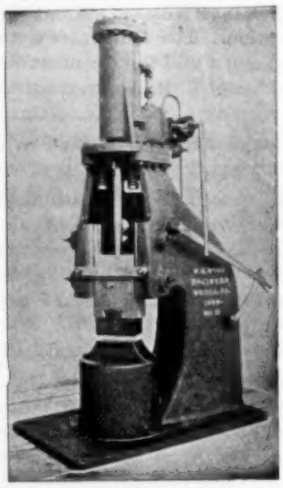

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*Daily. †Daily except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	† 3:15 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:40 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
Alliance and Pittsburgh	*11:10 pm	* 4:30 am

Mt. Vernon and Pan-Handle Route

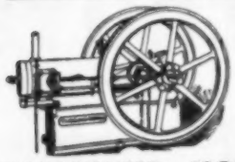
FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:50 am	* 5:30 pm
Akron and Columbus	* 8:50 am	* 5:30 pm
Akron and Columbus	† 1:40 pm	†12:10 pm
Columbus and Cincinnati	* 8:00 pm	* 7:30 am

The Cleveland Terminal & Valley R. R. Co.

(B. & O. System.)

Depot foot of So. Water St. City Office 241 Superior St.	Arrive.	Depart.
Valley Jctn. & Way Stations	*6:20 P M	*7:10 A M
Akron, Canton & Valley Jct	*10:00 A M	*3:30 P M
Akron, Canton & Chicago	*8:10 A M	*6:35 P M
Akron, Canton & Wooster, Defiance, Garrett, Marietta, Wheeling, Washington, D. C., and Baltimore	†2:25 P M	†11:00 A

†Daily except Sunday. *Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago.



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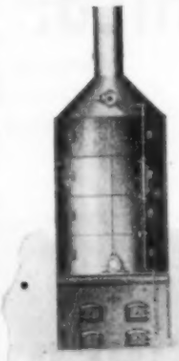

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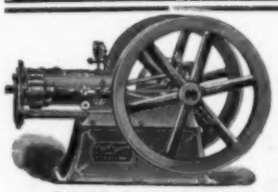

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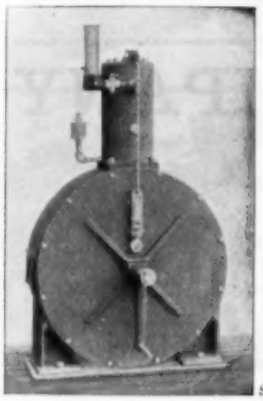

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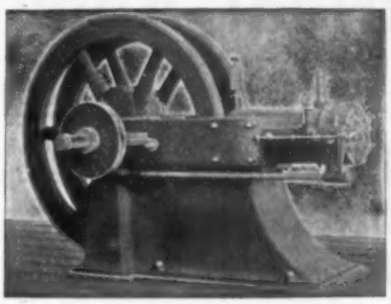

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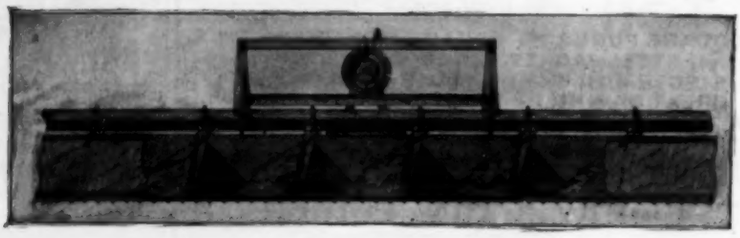

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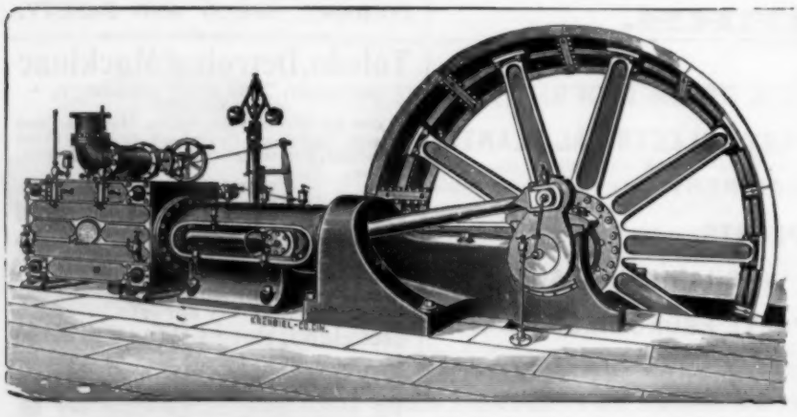

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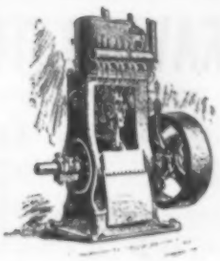

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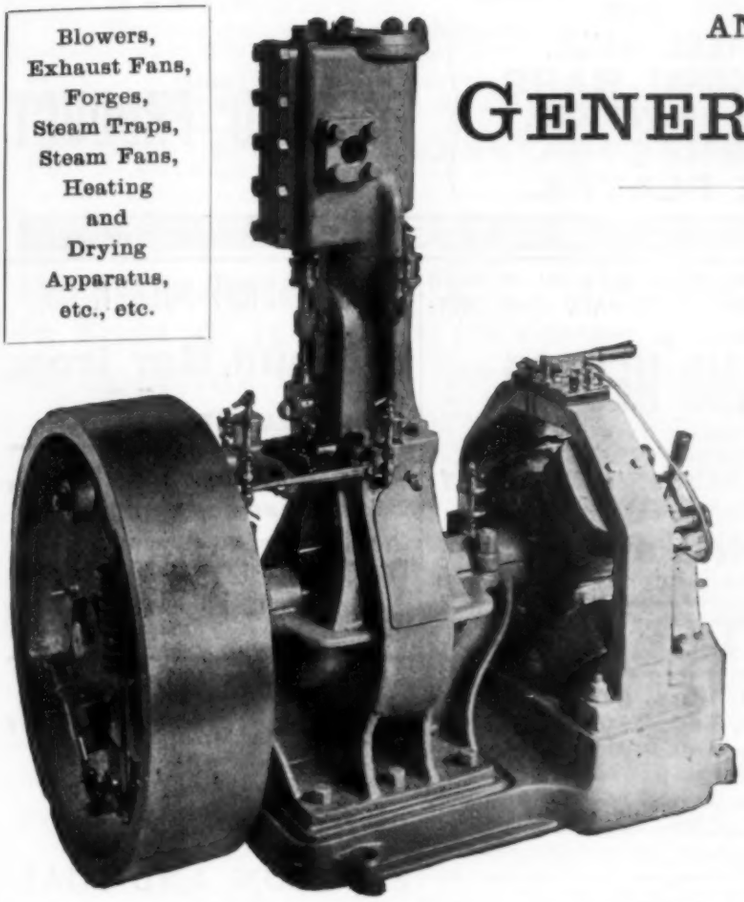

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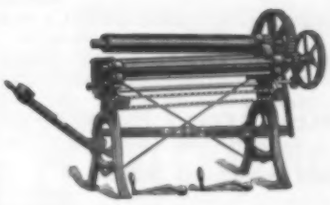

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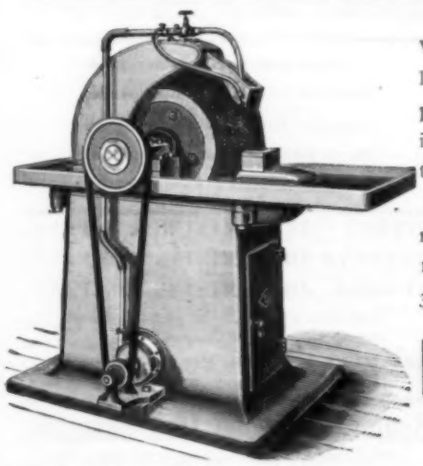

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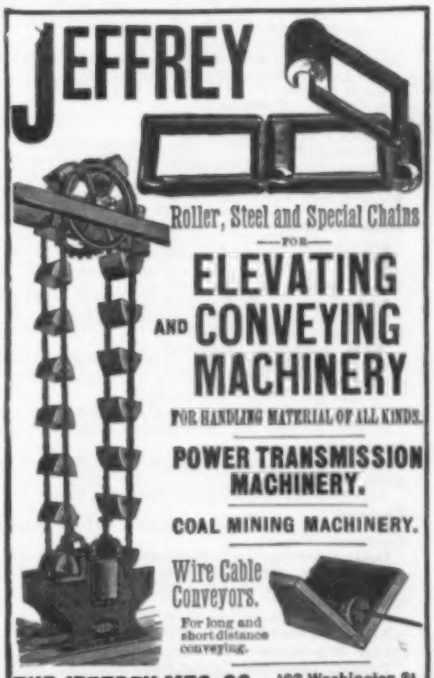

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Sykes Iron & Steel Roofing Co., Niles, O.
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Pickands, Brown & Co., Chicago, Ill.
M. A. Hanna & Co., Cleveland, O.
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Special low-phosphorus hard Ore, Bessemer	$3.40@ 3.46
No. 1 Specular, Bessemer	3.05@ 3.17
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No. 2 Gray Forge, neutral	8 75
No. 1 American Scotch	10 40
No. 2 American Scotch	10 15
Lake Superior Charcoal	12 75@ 13 00
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No. 1 Foundry	$10 25@ 10 50
No. 2 Foundry	9 50@ 9 65
Gray Forge	8 25@ 8 75
White and Mottled	8 50
Warm Blast Charcoal	14 50@ 15 00
Cold Blast Charcoal	17 00
Bessemer	9 65@ 9 75
CHICAGO:	
Lake Superior Charcoal	$13 00@$13 25
Local Coke Foundry No. 1	10 25@ 11 00
Local Coke Foundry No. 2	10 25@ 10 75
Local Coke Foundry No. 3	10 00@ 10 50
Local Scotch Foundry No. 1	10 50@ 11 00
Local Scotch Foundry No. 2	10 25@ 10 75
Local Scotch Foundry No. 3	10 00@ 10 50
Southern Coke No. 1	10 75@ 11 00
Southern Coke No. 2	10 00@ 10 25
Southern Coke No. 3	9 60@ 9 85
Southern No. 1 Soft	10 60@ 10 85
Southern No. 2 Soft	10 00@ 10 25
Southern Silveries	10 60@ 10 75
Jackson Co. Silveries	12 50@ 14 50
Ohio Silveries No. 1	@
Ohio Strong Softeners	12 00@ 12 25
Alabama Car Wheel	16 50@ 16 00
Malleable Bessemer	10 75@ 11 00
Coke Bessemer	11 50@ 12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 75
Southern Coke No. 2 and No. 1 Soft	9 00@ 9 25
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	14 50@ 15 70
Tennessee Charcoal No 1	12 50@ 13 50
Jackson County Silvery No 1	12 50@ 13 00
Southern Coke, Gray Forge	8 25@ 8 50
" " Mottled	8 25@ 8 50
Standard Georgia Car Wheel	14 25@ 15 00
Tennessee " "	13 00@ 14 00
Lake Superior " "	14 75@ 15 25
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	10 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 00
Ohio Strong Softener No. 1	10 50
Jackson Co. Silvery No. 1	14 00
Lake Superior Charcoal	14 00
Southern Soft No. 1	10 75
Hanging Rock Charcoal	17 00
ST. LOUIS:	
Southern Coke No 1	$ 9 50@$ 9 75
Southern Coke No. 2	9 00@ 9 25
Southern Coke No. 3	8 50@ 8 75
Southern Gray Forge	8 00@ 8 25
Southern Charcoal No. 1	13 00
Missouri Bessemer	12 00
Ohio Softeners	13 50
Lake Superior Car Wheel	14 50
Southern Car Wheel	14 50

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Old iron rails	$12 00
Old steel rails (6 ft. and over)	10 00
Old steel rails (6 ft. and under)	9 00
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Mill scrap	7 25
No. 1 Machine cast scrap	8 00
Iron axles	13 25
Axle turnings	7 50
Wrought turnings (free from cast)	5 50
Cast borings	4 50
Uncut wrought iron boilers	3 50
Steel boiler plates	7 00
Grate bars	5 25
Pipes and flues (clean)	6 50
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Hoop and band iron	5 00
Sheet iron	5 00
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Universal Plates	1.10@1.15c
Sheared Plates	1.15c

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1 to 1⅞	1.00 Base.
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3½ to 4	.80 "
4⅛ to 4⅝	1.00 "
4¾ to 5	1.30 "
5¼ to 6	1.80 "
6¼ to 6⅝	2.20 "

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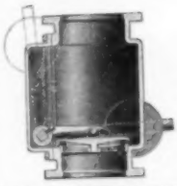

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This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

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⅞ to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

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8¼ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅛ to 1⅜ x ⅛ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
¾ to 15-16 x ⅜ to ⅞	.40 "
⅝ to 11-16 x ⅜ to ⅞	.50 "
½ to 9-16 x ⅜ to ⅞	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6⅜ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1½ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	30 "
⅜ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅞ to 1½	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¾ to 3	.60 extra.
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4 50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base.
		Extras.
1⅛ to 6,	" 10, 11, 12 or 1/4"	.05 per 100 lbs.
1 to 1⅜,	" 7, 8, 9 or 3-16"	.10 "
1 to 1⅜,	" 10, 11, 12 or 1/4"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or 1/4"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10 11, 12 or 1/4"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10 11, 12 or 1/4"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or 1/4"	.60 "
7-16	" 7, 8, 9 or 3-16"	.73 "
7-19	" 10, 11, 12 or 1/4"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or 1/4"	1.05 "

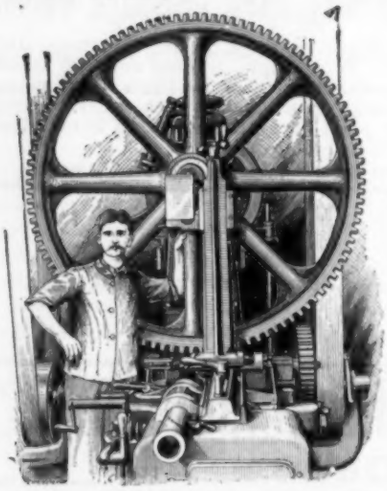
Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base
		Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15
1 7-16 to 1¾,	" 22	.25
1 ⅛ to 1¾,	" 13, 14 and 15	.05
1⅛ to 1¾	" 16, 17 and 18	.10

F. A. ESTEP, Pres. & Treas. J. R. McGINLEY, Vice Pres't. THOS. FAWCUS, Supt.

SPUR, BEVEL OR SPIRAL
GEARS
RACKS, QUADRANTS AND WORM GEARING

CUT GEARS ONLY



FOR LIGHT AND HEAVY DUST.

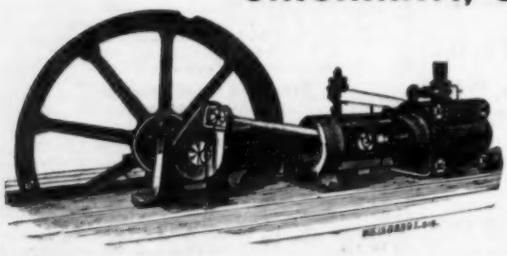
NO TROUBLE TO GIVE ESTIMATES. WRITE US.

R. D. NUTTALL CO.,
99 BOQUET STREET, ALLEGHENY, PA.

Persistence in Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is confidently expected in the United States in the very near future, advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity.

THE LANE & BODLEY CO.,
CINCINNATI, OHIO.



Engines,
ALL SIZES.
Simple and Compound.
Shafting, Hangers, Pulleys.
Belt Elevators, Saw Mills.

1¼ to 1⅜,	"	19 and 20	.15 per 100 lbs.
1⅜ to 1½,	"	21	.20 "
1½ to 1¾,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞,	Nos.	13, 14 and 15	.20 "
⅞,	"	16, 17 and 18	.25 "
⅞,	"	19 and 20	.30 "
⅞,	"	21	.35 "
⅞,	"	22	.45 "
¾ and 13-16	Nos.	13, 14 and 15	.30 "
¾ and 13-16	"	16, 17 and 18	.35 "
¾ and 13-16	"	19 and 20	.40 "
¾ and 13-16	"	21	.45 "
¾ and 13-16	"	22	.50 "
¾ and 13-16	"	23	.60 "
11-16,	Nos.	13, 14 and 15	.35 "
11-16,	"	16, 17 and 18	.40 "
11-16,	"	19 and 20	.50 "
11-16,	"	21	.60 "
11-16,	"	22	.70 "
11-16,	"	23	.80 "
⅝,	Nos.	13, 14 and 15	.40 "
⅝,	"	16, 17 and 18	.45 "
⅝,	"	19 and 20	.55 "
⅝,	"	21	.65 "
⅝,	"	22	.75 "
⅝,	"	23	.85 "
9-16,	"	13, 14 and 15	.45 "
9-16,	"	16, 17 and 18	.50 "
9-16,	"	19 and 20	.60 "
9-16,	"	21	.70 "
9-16,	"	22	.80 "
9-16,	"	23	.90 "
½,	"	13, 14 and 15	.55 "
½,	"	16, 17 and 18	.60 "
½,	"	19 and 20	.70 "
½,	"	21	.80 "
½,	"	22	.90 "
½,	"	23	1.00 "
7-16,	"	13, 14 and 15	.80 "
7-16,	"	16, 17 and 18	.90 "
7-16,	"	19 and 20	1.00 "
⅜,	"	13, 14 and 15	1.00 "
⅜,	"	16, 17 and 18	1.10 "
⅜,	"	19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

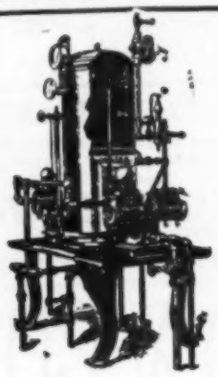
The Link-Belt Machinery Co.

ENGINEERS. FOUNDERS. MACHINISTS.

CHICAGO, U. S. A.

Modern Methods as applied to the handling of Iron Ore, Coal, Raw and Manufactured Products.

Manila Rope, Power Transmissions, Shafting, Pulleys, Shaft Bearings, Gearing Friction Clutches, etc.



IMPROVED DUPLEX SYSTEM

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BURNING FUEL OIL.

Heats and cleans the oil and delivers it to the fires under high and uniform pressure.

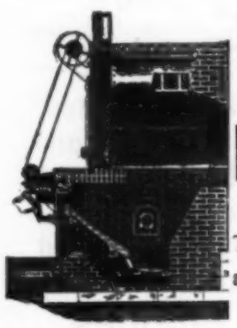
Entirely automatic, most scientific, sensible and economical method of burning oil in existence. If you are operating a Steel Works, Brass or Copper Rolling Mill, Malleable Iron Works, Bolt and Nut Works, Bicycle Works, or do Annealing, Forging, Brazing, Tempering, Japanning, Enameling, Case Hardening, you can use this machine to your advantage.

WE BUILD FURNACES OF ALL KINDS. SATISFACTION GUARANTEED.

W. S. ROCKWELL & CO.,

26 CORTLANDT STREET, NEW YORK.

H. H. CAMPBELL.



Brightman Furnace Co.

648 Broadway, CLEVELAND, O.

SOLE MANUFACTURERS OF THE

Brightman Mechanical Stoker

FOR STEAM BOILERS.

THE MOST ECONOMICAL IN FUEL

and the Best Device in the World for Preventing Smoke.

Send for Catalogue "A."

STUART FIRE BRICK CO.

MANUFACTURERS OF

Silica Brick

For Open-Hearth, Basic and Acid Steel Furnaces, Glass and Coppe Tank Furnaces. Extra Shapes MADE TO ORDER.

Office, Room 21, Conestoga Bldg., Cor. Wood and Water Sts., PITTSBURG, PA.

The Chicago & North-Western Railway

REACHING with its 7,966 miles of road the famous Water Powers, Coal Fields, Iron Ore Ranges, Hard and and Soft Lumber Districts located in Illinois, Wisconsin, Michigan, Iowa, Minnesota, South Dakota, North Dakota, Nebraska and Wyoming, and by traffic arrangements with other railways, 7,350 stations located on 41,000 miles of railroad (one-ninth of the entire railroad mileage of the world, and one-fourth of the railroad mileage of the United States), has on its line more industries than any other western railroad.

Manufacturers contemplating moving or establishing branch factories in the West are requested to inquire what we can offer them before locating elsewhere.

M. HUGHITT,
General Freight Agent,
CHICAGO.

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05
Above includes plates 90 inches wide.	
90 to 96 in. wide	⅛c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1⅛c. "
104 to 106 in. wide	special.

Flats. cts. lbs.

2 to 9-16 in. wide by 2 to ⅝ thick .08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and bent	"	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON. cts. lbs.

1 to 2 in. inclusive	.08
9-16 to ⅝ in. "	.08
7-16 to ⅜ and 2⅜ to 3 in	.09
3⅛ to 4 in	.09⅜
⅝ to 11-16 and 4⅛	.10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	.11
1 in	.13

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	3 co
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black, base,	four 10s		.62
Butt " " "	four 10s		.62½
Lap " galv. "	four 10s		.52½
Butt " " "	four 10s		.50
Boiler tubes 2¼" and smaller			.70
Boiler tubes 2½" and larger			.75
Casting screw and socket joint			dis. 52½
Casing inserted joint			dis. 47½

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

Magnolia Anti-Friction Metal, 25 cts. per lb. f. o. b. New York or Chicago.
No Name Metal, 18 cts. per lb., f. o. b. New York or Chicago.
Mystic Metal. 8 cts. per lb., f. o. b. New York or Chicago.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard		dis 10 & 10
" " "	extra	dis 60&10
" " "	best	dis 55
Cleveland Rubber Co. extra standard		dis 60&10
Hoyt's Short Lap		dis 50
Shultz Raw Hide Leather Belting, single		dis 40
Munson's Short Lap Single Leather		dis 50
Munson's Short Lap Double and Light Double Leather		dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double		dis 40
Standard, oak tanned		dis 50&10
Alexander Brothers' pure oak tanned		dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35

Chucks.

Cushman's 4 Jaw Independent		dis 45
"	Combination	dis 40
"	Geared Scroll	dis 80
"	2 Jaw Brass Workers	dis 30
"	Drill	dis 35
Wescott's Scroll Combination		dis 33⅓
"	Independent	dis 40
"	Little Giant Drill	dis 33⅓
Horton's Independent		dis 45
Whiton's Independent		dis 45
National Combination		dis 45
Sweetland "		dis 40
Almond Drill		dis 40
Morse "		dis 20
Skinner's Combination Lathe		dis 40&15
"	Independent Lathe	dis 40&10
"	Universal Lathe	dis 40&10
"	Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 10 to 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutiers	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	
Morse Taper&Straight Shank to 1⅛"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1⅛"	dis 15
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

Emery.

	No. 4 to No. 54 Flour, 46 gr.	150 gr.	C. F F. F
Kegs, ℔ lb	4½c	5 c	2½c
¼ kegs ℔ lb	4¼c	5¼c	2¾c
¼ kegs ℔ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6¾c	5 c
10 lb cans less than 10	10 c	10 c	¼c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 50@50&5
H. H. Barton ..... dis 50@50&5

Emery Wheels.

Detroit ..... dis 60@70
Norton's ..... dis 60@70
Crant ..... dis 60@70
Sterling ..... dis 60@70
Celluloid ..... dis 10&33⅓
Northampton ..... dis 50
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@70
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 60@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs 10c
" " " " over 5 lbs 8c

Jack Screws.

Illinois Bolt Co. list ..... dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅛	11¼	8¼	6	5⅛	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ℔ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ℔ keg, base.
Car lots $1 30
Less than car lots $1 40

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz ..... dis 10@10&10

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 55
Pulley Taps ..... dis 40

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 15@20
Howard ..... dis 35

Wire.

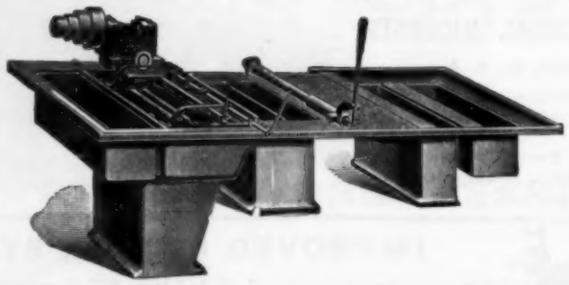
New List, Apr. 9, 1894

Brass ..... dis 35
Copper ..... dis 35c
Bright and annealed, Nos. 0@18 ..... dis 70&10@75
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... 95c ℔ lb dis 30

FOR
ARTISTIC
PRINTING
WRITE
THE
CLEVELAND
PRINTING &
PUBLISHING CO.,
CLEVELAND, O.

THE LLOYD-BOOTH CO., YOUNGSTOWN, OHIO.

Tinning MACHINERY.



Rolling Mills, Sand and Chill ROLLS.

WORLD'S FAIR AWARD

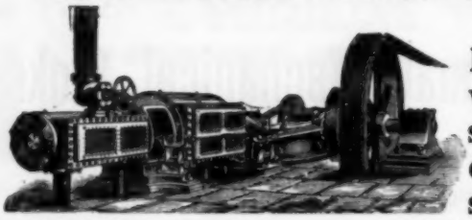
We are the only Steel Roofing Co. awarded Medal and Diploma for PATENT CAP ROOFING at World's Columbian Exposition. We are also large manufacturers of all styles of METAL ROOFING, SIDING, CEILING, ETC. Send for Catalogue and Price List. Mention this paper.

SYKES IRON & STEEL ROOFING CO., • Chicago and Niles, O.

WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



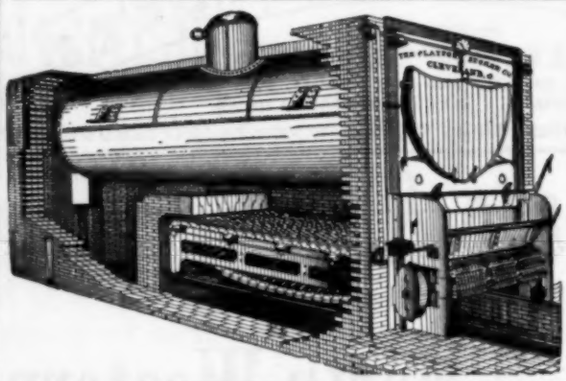
Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Williams Improved Vertical Engines

For Direct Electrical and all High Class Work.

39-41 Cortland St., N. Y. E. F. WILLIAMS.

Park Building, Pittsburg, SEWARD S. BABBITT.



The Playford Mechanical Stoker

Guaranteed to

Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.,

No. 61 Case Library Bldg.,

CLEVELAND, O.

LUNKENHEIMER'S

Pop Safety Valves

Enjoy the distinction of being the best valves on the market.

They excel in material, workmanship, construction, size of spring, relieving capacity and durability.

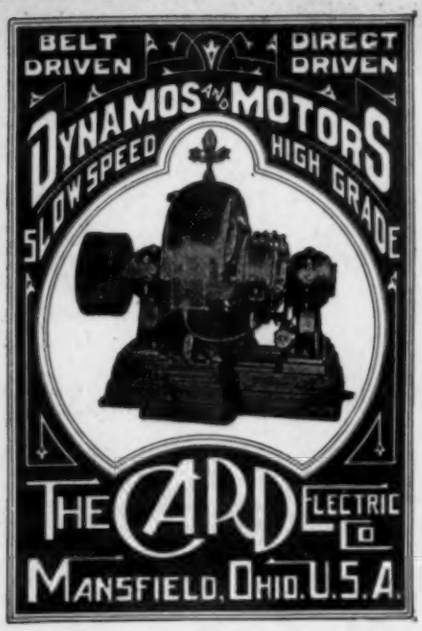
Specify them if you require the best. They always give satisfaction. Every valve carefully tested, inspected and warranted. Your dealer supplies them if you ask for them. Catalogue gratis.

THE LUNKENHEIMER COMPANY,

Cincinnati, Ohio, U. S. A.

SOLE MANUFACTURERS.

26 Cortlandt St., NEW YORK. } BRANCHES { 36 Great Dover St. LONDON, S. E.



If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

J. M. ALLEN, President.
WM. B. FRANKLIN, Vice-President.
F. B. ALLEN, Second Vice-President.
T. B. PIERCE, Secretary and Treas.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.
HARTFORD, CONN.

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C. A. BURWELL, Chief Inspector, 32 Wilshire Bldg., Cleveland, O.

J. E. WOLCOTT, Special Agent, Room 32, Wilshire Bldg., Cleveland, O.

CLEVELAND ELECTROTYPE CO.
ELECTROTYPING ENGRAVING AND STEREOTYPING.
50 HIGH ST. — TEL. 2139.

ESTABLISHED 1854.

PETER GERLACH & CO.,
MAKERS OF
Saws, Tools and Machinery.
Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.
Cleveland, Ohio, U. S. A.

THE BETHLEHEM IRON CO.,
WORKS AND PRINCIPAL OFFICE,
SOUTH BETHLEHEM, PENNA.

RAILS, BILLETS, MUCK BARS.

FORGINGS of all descriptions, either Solid or Hollow, made from Fluid-Compressed, Hydraulic Forged Open Hearth Steel.
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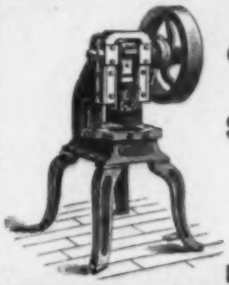

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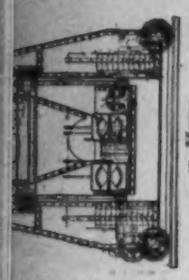

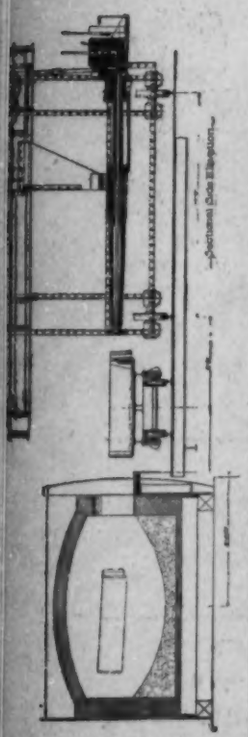

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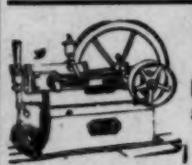

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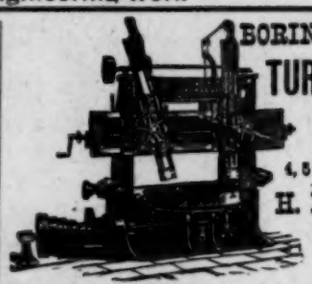

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